

M O D E R N  
A G R I C U L T U R E ;  
O R , T H E  
P R E S E N T S T A T E O F H U S B A N D R Y  
I N  
G R E A T B R I T A I N .

I N C L U D I N G ,  
A N A C C O U N T O F  
T H E B E S T M O D E S O F C U L T I V A T I O N P R A C T I S E D  
T H R O U G H O U T T H E I S L A N D ;  
T H E O B S T A C L E S T O F A R T H E R I M P R O V E M E N T S ;  
A N D T H E M E A N S B Y W H I C H T H E S E M A Y B E M O S T  
E F F E C T U A L L Y R E M O V E D .

---

B Y J A M E S D O N A L D S O N , D U N D E E .

---

I N F O U R V O L U M E S .

V O L . I I I .

---

Turn to the arts, the useful pleasing arts  
Of cultivation; and those fields improve  
Your erring fathers left too long despis'd,  
Leave not to ignorance and low-bred hinds,  
That noblest science, which in ancient time  
The minds of sages and of kings employ'd,  
Solicitous to learn the ways of God,  
And read his works in agriculture's school.

D O D S L E Y

---

E D I N B U R G H :

P R I N T E D B Y A D A M N E I L L A N D C O M P A N Y .

---

1796.



1870  
AUGUST 11

STATE OF MASSACHUSETTS

IN

AND

IN

AND

AND





# CONTENTS.

## VOLUME III.

### CHAPTER XVIII.

*The Culture of Hops, Hemp and Flax, and the*

*Uses to which they are applied.* Page 1

Sect. I. *Of the Culture of Hops,* 3

II. *of Hemp,* 19

III. *of Flax,* 30

CHAP-

## CHAPTER XIX.

|                                                                |    |
|----------------------------------------------------------------|----|
| <i>Orchards, and the Method of making Cyder<br/>and Perry,</i> | 47 |
|----------------------------------------------------------------|----|

## CHAPTER XX.

|                                                                                                             |    |
|-------------------------------------------------------------------------------------------------------------|----|
| <i>On Fallowing, and some Observations on Dib-<br/>bling Wheat and Beans; and on Drill Huf-<br/>bandry,</i> | 66 |
|-------------------------------------------------------------------------------------------------------------|----|

|                               |    |
|-------------------------------|----|
| Sect. I. <i>On Fallowing,</i> | 67 |
|-------------------------------|----|

|                                         |    |
|-----------------------------------------|----|
| II. <i>On Dibbling Wheat and Beans,</i> | 83 |
|-----------------------------------------|----|

|                                                         |    |
|---------------------------------------------------------|----|
| III. <i>Some Observations on Drill Huf-<br/>bandry,</i> | 90 |
|---------------------------------------------------------|----|

## CHAPTER XXI.

|                                                      |     |
|------------------------------------------------------|-----|
| <i>Live-Stock,—as Horses, Cattle, Sheep, &amp;c.</i> | 107 |
|------------------------------------------------------|-----|

Sect.



# CONTENTS,

|                         |   |     |
|-------------------------|---|-----|
| Sect. I. <i>Horses,</i> | - | 110 |
| II. <i>Cattle,</i>      | - | 138 |
| III. <i>Sheep,</i>      | - | 171 |
| IV. <i>Swine,</i>       | - | 212 |
| V. <i>Rabbits,</i>      | - | 223 |

## CHAPTER XXII.

|                                   |   |     |
|-----------------------------------|---|-----|
| <i>The Management of a Dairy,</i> | - | 228 |
|-----------------------------------|---|-----|

|                                                                                                                       |   |     |
|-----------------------------------------------------------------------------------------------------------------------|---|-----|
| Sect. I. <i>Dairy Management, where the Milk fresh from the Cow, is sold for the use of the inhabitants of towns,</i> | - | 233 |
|-----------------------------------------------------------------------------------------------------------------------|---|-----|

|                                                     |   |     |
|-----------------------------------------------------|---|-----|
| II. <i>Ditto, where Butter is the chief object,</i> | - | 235 |
|-----------------------------------------------------|---|-----|

|                                                           |   |     |
|-----------------------------------------------------------|---|-----|
| III. <i>Ditto, where both Butter and Cheese are made,</i> | - | 252 |
|-----------------------------------------------------------|---|-----|

|                                                         |   |     |
|---------------------------------------------------------|---|-----|
| IV. <i>Dairy Management, where Cheese only is made,</i> | - | 260 |
|---------------------------------------------------------|---|-----|

Sect.

|                                                                                               |     |
|-----------------------------------------------------------------------------------------------|-----|
| Sect. V. <i>General Observations on Dairy Husbandry, the methods of feeding Cows, &amp;c.</i> | 283 |
|-----------------------------------------------------------------------------------------------|-----|

### CHAPTER XXIII.

|                                                                                                         |     |
|---------------------------------------------------------------------------------------------------------|-----|
| <i>Removing Obstacles to the introduction of improved Cultivation, as Stones, Furze, Broom, &amp;c.</i> | 289 |
|---------------------------------------------------------------------------------------------------------|-----|

### CHAPTER XXIV.

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| <i>The various Methods of Inclosing adopted in Great Britain,</i> | 299 |
|-------------------------------------------------------------------|-----|

### CHAPTER XXV.

|                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------|-----|
| <i>The Importance of Draining, and an account of the different ways in which Lands are drained,</i> | 340 |
|-----------------------------------------------------------------------------------------------------|-----|

### CHAPTER XXVI.

|                                                                     |     |
|---------------------------------------------------------------------|-----|
| <i>The best and least expensive methods of forming Embankments,</i> | 367 |
|---------------------------------------------------------------------|-----|

CHAP.

CONTENTS.

vii

CHAPTER XXVII.

*Paring and Burning,*

379

CHAPTER XXVIII.

*Irrigation, or the Watering of Land,*

400

MODERN







PATENT OFFICE LIBRARY

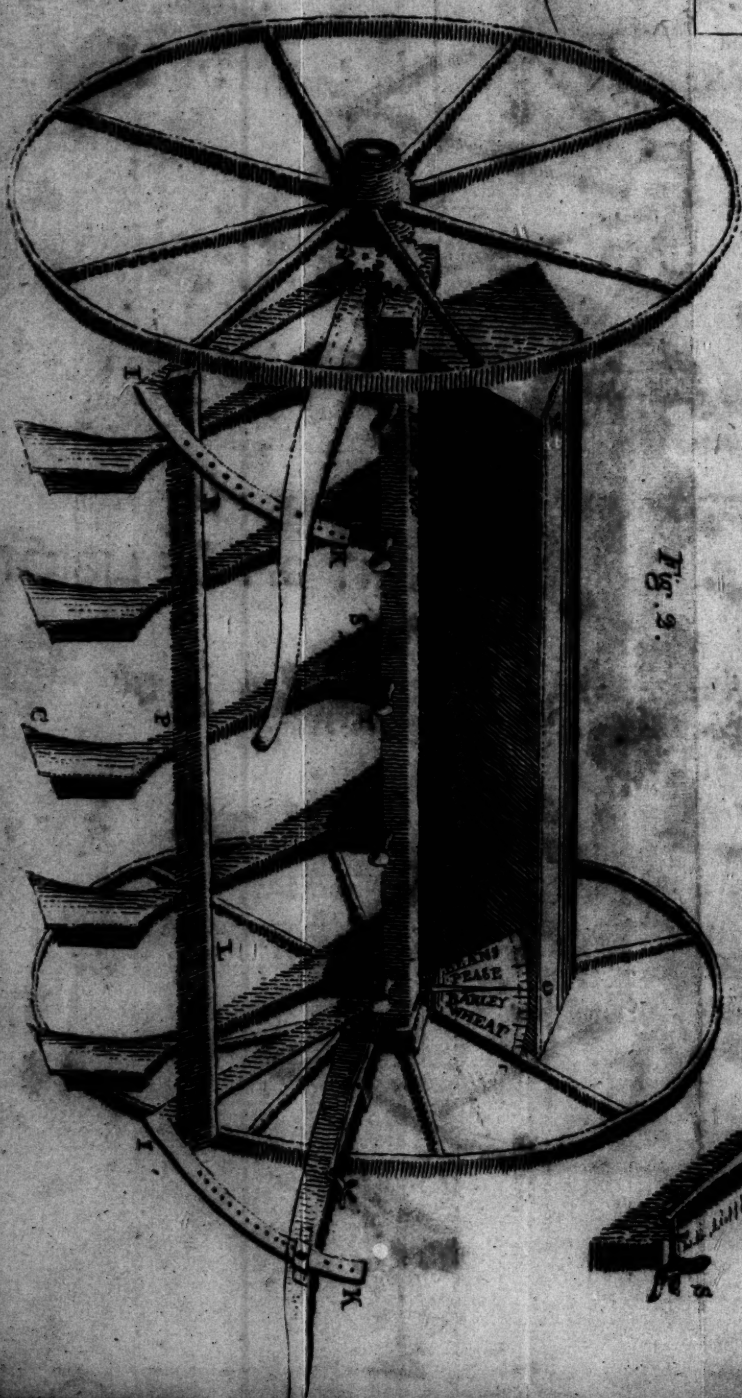
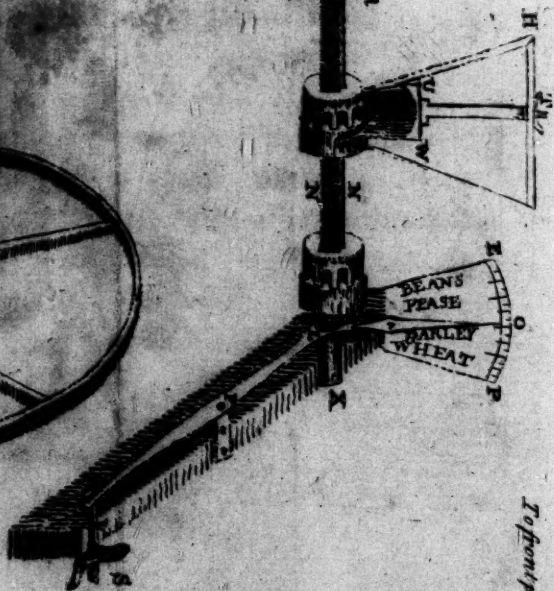


Fig. 2.



Fig. 1.





to advantage on a large scale, we have but feebly  
 omitted to mention the progress of their culture;  
 to **MODERN AGRICULTURE,**



The chapter will be found divided into three  
**PRESENT STATE OF HUSBANDRY**

IN

Section I. Of the Culture of Hops.  
**GREAT BRITAIN.**

Section II. Of Hemp.

Section III. Of Flax.

## CHAPTER XVIII.

*The Culture of Hops, Hemp, and Flax; and the  
 Uses to which they are applied.*

**I**N this chapter it is proposed to treat of such  
 crops, as, although not common, are never-  
 theless cultivated to considerable extent in some  
 particular districts. Besides these crops above  
 mentioned, the culture of several others, viz.  
 buckwheat, woad, madder, liquorice, &c. as  
 occupying some portion of the British soil,  
 ought probably, in strictness, to have been de-  
 scribed. But as these can never be cultivated

to advantage on a large scale, we have purposely omitted to mention the modes of their culture; a subject which could not be very interesting to the generality of readers.

The chapter will be found divided into three sections, as under :

Section I. Of the Culture of Hops,

II. Of Hemp.

III. Of Flax;

CHAPTER XVIII.

SEC-



## SECTION I.

*The Culture of Hops.*

THE hop plant was first introduced into England from the Netherlands, about the year 1523. It has a weak jointed stalk, with rough leaves, and is of a climbing nature; as when it attaches itself to a tree, pole, or other support, it creeps up, in a spiral form, to the height sometimes of twenty feet, and upwards.

Although hops are now considered in every part of Great Britain as a necessary ingredient in porter, ale, and small beer, yet, when the use of them was first introduced, they were supposed to possess some dangerous qualities; and an act of Parliament was accordingly passed, in the reign of James VI. prohibiting the use of them\*.

The cultivation of hops is confined chiefly to the counties of Kent and Worcester; but in many others, as Essex, Suffolk, Nottingham, &c. there are some considerable plantations; and the  
writer

\* However extraordinary it may appear, this act remains unrepealed; although, by another passed in the reign of Queen Anne, it is ordained, That no common brewer, &c. shall use any bitter ingredient, *instead* of hops, on pain of L. 20 penalty.



writer has seen a small hop-ground so far north as Aberdeenshire.

There is supposed to be only one species of the hop-plant, although there is known to be several varieties; and these, when in flower, of different colours, as red, green, and white. The first is best adapted to cold unfavourable climates, being more hardy than the others. The green, notwithstanding it is less hardy than the red, is more productive; and the white, which is still more delicate and tender, is the most valuable, as besides being the earliest, the produce also sells highest at market.

As these different varieties of hops become ripe at different periods, the hop-planters are therefore extremely cautious not to mix several varieties promiscuously in the same ground; while, for the same reason, namely, their ripening at different periods, the farmers find it materially for their interest to have the several sorts planted either in separate grounds, or detached from each other in the same ground. Without this precaution, the picking, drying, &c. of an abundant crop would require a greater number of hands than could be easily procured. Whereas, when the crop becomes ripe at different periods, the work goes on with more regularity, and the requisite number of hands is more easily procured.

The

The most desirable situation for a hop-plantation, is ground, sloping gently towards the south, or south-west, and screened by means of high grounds, or forest-trees, from the north and north-east. At the same time, it ought not to be so confined as to prevent that free circulation of air, which is indispensably necessary where plants grow so close together, and to such a height. A free circulation of air, in a hop-ground, not only conduces to the health and vigour of the plants, but also prevents the crops from being blighted, or what the hop-farmers call fire-blasted, which often happens towards the middle of a large close planted hop-ground; while the outskides, in consequence of the more free circulation of air that there takes place, receive no injury.

The soils most favourable to the growth of hops, are clay, and strong deep loam; but it is also of great importance, that the sub-soil should be dry and friable. A cold, wet, tenacious, clayey, under stratum, is found extremely injurious to the roots of the plants, as when they penetrate below the good soil, they soon become unproductive, and ultimately decay.

In forming a hop-ground, that is, in preparing the land previously to planting, considerable attention is necessary, by fallowing, or otherwise to destroy the weeds, and to reduce the soil to as pulverized a state as possible. The ridges should  
also

also be made level, and dung applied with a liberal hand.

When it is proposed to keep the hop-ground clean, by means of ploughing, the plants are set in equidistant rows; but when the farmer proposes to extirpate the weeds, by manual labour, the form in which the plants are arranged is not considered of so much importance, provided sufficient room be allowed between each plant, or rather each hill, and which in no case should be under nine or ten feet from the centre of the one to the centre of the other.

March is the ordinary season for setting out the plants, and the following is the method in which the operation is performed. The land having been previously cleaned and prepared, dung is laid on the field in small heaps near the places where it is proposed to plant the hop slips or sets. These places are commonly marked off, by placing a number of stakes at proper and regular distances; that done, small pits are formed, by taking out a spit or spade depth of earth, and the earth below being gently loosed, a certain quantity, about half a bushel of dung, is laid thereon, then the earth that was formerly taken out, is again replaced, and so much added as to form a small hillock. On this hillock, five, six, or seven sets, procured from the roots or shoots of the old stock, are dibbled in. The plants are placed in a circular form towards the  
top



top of the hillock, and at the distance of five or six inches from each other. They are made to incline towards the centre of the hillock, where another plant is commonly placed. In regard to the plants that are proper, the most necessary thing to be attended to is, that they have each two joints; from the one which is placed in the ground, springs the root, and from the other the stalk, provincially the *bind*.

When the sets are planted, they require no more labour or attention, except keeping the ground around them clean, and free of all sorts of weeds till towards the end of May, when the young shoots having made some progress, it is common to increase the size of the hill on which they were planted to a greater size than it was when first formed, and which is done by adding some of the finest and richest earth from the interstices. In the end of June, or beginning of July, those farmers who are not so avaricious as to set poles among the young shoots, with a view of reaping a partial crop the first year, to the imminent danger of injuring the future produce of the plantation, generally twist the young buds into a bunch or knot, so that by thus discouraging their growth, the roots are enabled to spread out more vigorously, and to acquire strength previous to the approach of the winter.

The young plantation is treated the second year in every respect similar to those of older

standing with proper management; and when the soil is properly adapted to the growth of hops, a plantation will continue in full bearing for twenty or thirty years, all that is requisite being only to supply occasionally any deficiency of plants that may take place in some particular hills.

In the proper management of a hop-ground, great attention is required in order to render it productive. Whether it be kept clear by ploughing, or by the spade and the hand-hoe, the soil should be turned over at least two or three times in ordinary seasons, and oftener, if any number of weeds appear. The plants also require great attention and considerable labour. On the return of good weather in the spring, the hills are spread out in order to give opportunity to prune and dress the stocks. The earth being then cleared away from the principal roots by an iron instrument called a picker, the remains of the former years binds are cut off, together with the shoots which were not allowed to attach themselves to the poles the former season, and also any young suckers that may have sprung up about the edges of the hills, so that nothing is allowed to remain that is likely to injure the principal roots, or impede their shooting out strong vigorous binds at the proper season. After the roots are properly cleaned and pruned, the hills are again formed, with an addition, if

not every year, at least every second or third year, of a proper quantity of compost manure, that had been previously laid in small heaps on the hop ground in the course of the winter, or in the early part of spring. Soon after the hills are formed, or towards the end of April, the new shoots begin to appear, at which time the operation of setting the poles commences. These are straight slender shoots of underwood, ash, oak, chesnut, or willow, from sixteen to twenty feet high. These poles are set two, but more frequently three to a hill; they are so placed as to leave an opening towards the south, to admit the sun-beams. The manner of fixing them is by making deep holes or openings in the ground, with an iron crow. Into these holes the root-ends are put, when the earth is rammed so hard about them, that they very seldom alter from the position in which they were placed, except on occasion of very violent gales of wind. Great care is necessary in placing the poles, and no less judgment and experience in determining what ought to be the proper height. When very long poles are set in a hop-ground where the stocks are too old or too young, or where the soil is of indifferent quality, the stocks are not only greatly exhausted, but the crop always turns out unproductive; as, till the binds reach the top, or rather till they overtop the poles, which depends on the strength of the



stocks, and the quality of the soil, the lateral branches on which the hops grow never begin to shoot out or make any progress.

After the poles are fixed, a great number of the young shoots naturally twine round them, but people are also employed to go through the plantation, for the purpose of guiding any shoots that are taking a wrong direction, and of sorting them so, that only two or three, and these the strongest and most healthy, are permitted to attach themselves to each pole. All the superfluous binds are cut off, so as to prevent their spreading over the grounds, or impeding the growth of those that are allowed to stand for a crop. The only other operation, necessary to be attended to, previous to the commencement of what may be called the hop-harvest, besides that of occasionally cleaning the ground of weeds, is, to tie the binds to the poles. This requires the labour of a number of persons; women are generally employed, who tie the binds to the poles in several different places with withered rushes, but so loosely, as not to prevent the binds from advancing in their progress towards the top of the poles. When the binds have got to such a height as to be beyond reaching with the hand, proper persons go round, and, using standing ladders, tie all the binds that appear inclined to stray from the poles.

Hops

Hops are known to be ready for pulling when they acquire a strong scent, and the seeds become firm, and of a brown colour, which, in ordinary seasons, happens in the first or second week of September. When the pulling season arrives, the utmost assiduity is requisite on the part of the planter, in order that the different operations may be carried on with regularity and dispatch, as the least neglect, in any department of the business, proves in a great degree ruinous to the most abundant crop, especially in precarious seasons. Gales of wind, at that season, by breaking the lateral branches, and bruising the hops, prove nearly as injurious as a long tract of rainy weather, which never fails to spoil the colour of the crop, and thereby renders it less saleable at market.

As a preparation for pulling the hops, frames of wood, in number proportioned to the size of the field, and the pickers to be employed, are placed in that part of the field, which, by having been most exposed to the influence of the sun, is soonest ready. These frames, called bins or cribs, are very simple in the construction, being only four pieces of boards nailed to four posts or legs, and, when finished, are about seven or eight feet long, three feet broad, and about the same height.

A man always attends the pickers, whose business it is to cut over the binds near the ground,  
and

and to lay the poles on the frames to be picked. Commonly two, but seldom more than three, poles are laid on at a time. Six, seven, or eight, pickers, women, girls, and boys, are employed at the same frame, three or four ranged on each side. These, with the man who sorts the poles, are called a set. The hops, after being carefully separated from the leaves, and branches, or stalks, are dropped by the pickers into a large cloth, hung all round within-side the frame on tenter hooks. When the cloth is full, the hops are emptied into a large sack, which is carried home, and the hops laid on a kiln to be dried. This is always done as soon as possible after they are picked, as they are apt to sustain considerable damage, both in colour and flavour, if allowed to remain long in sacks in the green state in which they are pulled. In very warm weather, and when they are pulled in a moist state, they will heat in five or six hours: for this reason the kilns are kept constantly at work, both night and day, from the commencement to the conclusion of the hop-picking season.

Diligent hop-pickers, when the crop is tolerably abundant, will pick from eight to ten bushels each in the day, which, when dry, will weigh about one hundred weight. It is common to let the picking of hop-grounds by the bushel: The price is extremely variable, depending no less on the goodness of the crop, than on the  
the



the abundance or scarcity of labourers. The greatest part of the hops, cultivated in England, are picked by people who make a practice of coming annually from the remote parts of Wales for that purpose. The writer has seen hundreds of these people travelling across the island from Wales to Kent, in quest of a few weeks employment at hop-picking ;—a convincing proof, first, how little value they set upon their time, and how destitute they are of the means of procuring subsistence in their own country ; and, secondly, how inattentive the proprietors are, in not taking advantage of that disposition for active employment, which these poor people thus evince. He would be a patriot indeed, who would introduce, and exert himself to establish, such manufactures, and such improved modes of husbandry, as would give the poor people in Wales constant and regular employment in their native country.

Before leaving the hop-ground, it may be proper to mention, that the poles, after being stripped of the hop-binds, are carefully set up in the manner best calculated to defend them from receiving any injury during winter.

The form of the kilns used for drying hops is not materially different from that of those used for drying malt. The hops are spread on a hair-cloth, and from eight to ten, sometimes twelve, inches deep, according as the season is dry or wet, and depending also on the state of the hops

in

in regard to ripeness. A thorough knowledge of the best method of drying hops can only be acquired by long practice. The general rules are, to begin with a slow fire, and to increase it gradually, till, by the heat on the kiln, and the warmth of the hops, it is known to have arrived at a proper height. An even steady fire is then continued for eight or ten hours, by which time, the ends of the hop-stalks become quite shriveled and dry, which is the chief sign by which to ascertain that the hops are properly and sufficiently dried. They are then taken off the kiln, and laid in a large room or loft, till they become quite cool; they are then in condition to be put into bags, which is the last operation the planter has to perform previous to sending his crop to market.

In the floor of the room where the hops are laid to cool, there is a round hole or trap in the floor, equal in size to the mouth of a hop-bag. After tying a handful of hops in each of the lower corners of a large bag, (containing four ells and a half of ell-wide cloth), which serve afterwards for handles, the mouth of the bag is fixed securely to a strong hoop, which is made to rest on the edges of the hole or trap; and the bag itself being then dropped through the trap, the packer goes into it; when a person, who attends for the purpose, puts in the hops in small quantities, in order to give the packer an opportunity

portunity of packing and tramping them as hard as possible. When the bag is filled, and the hops tramped-in so hard as that it will hold no more, it is drawn up, unloosed from the hoop, and the end sewed up, other two handles having been previously formed in the corners in the manner already mentioned.

The produce of hop-grounds has been as variously stated as the expence of management, and other charges; and the truth is, that on these subjects there are scarcely two farmers who will be found to agree even in the more important particulars.

The general average-produce for a number of years may be rated at from seven to ten hundred weight; but there is no crop cultivated in Great Britain, of which the returns by the acre are more precarious and uncertain than that of hops. A medium crop, owing to the heavy load of expence, does not yield the cultivator a return at all adequate to his expence and risk, a bad one is a very losing concern. Sometimes the produce of a particular hop-plantation is extraordinarily great, while the general crop is very indifferent.

Mr Young, in his *Annals of Husbandry*, vol. ii. p. 76. mentions, that a farmer in Kent, in the year 1783, netted L. 1100 of clear profit from the produce of eighteen acres and a half, or L. 59 : 9 : 2 the acre. It is owing to this  
3 circumstance,



circumstance, namely, that it is known there are such prizes in the lottery, that so many people devote their chief attention to the cultivation of hops. Many sensible people, however, reflecting, that such capital prizes can only fall to the lot of a few, and that the price of a chance, (the expence of forming the hop-ground, and the annual charge of management), is greater than a prudent man, under such circumstances, ought to risk, have lately grubbed up their plantations, and converted the lands into tillage or pasturage; others, again, possessing more of the spirit of adventure, have acted on principles diametrically opposite, in so much, that the number and extent of hop-grounds have, of late years, greatly increased.

The expence of management, including tithes, duty, renewal of poles, &c. is seldom less than L. 20, and very frequently amounts to L. 35 the acre, according to the rate of labour in the district, and the ease or difficulty of procuring poles. The manner in which the grounds are kept clean, whether by manual labour, or chiefly by the plough, and many other particulars, tend to augment or decrease the expence of management, so much as to render it difficult, if not impossible, to state generally what will apply to any particular case.

There are no doubt numerous situations in Great Britain, where the culture of hops is unknown

known, but in which that plant would grow in as great perfection as in any of the districts at present most famous for the quantity and quality of the hops which they produce. At the same time, it is extremely doubtful how far it would be profitable, either to the community, or to individuals, were a still greater portion of the British soil occupied as hop-plantations. The crop now annually cultivated appears, (from the clearest of all evidence, the gradual fall of prices in ordinary seasons), to be at least fully equal to the demand; while the very great advance in the price of labour, and of poles, which are both expensive and perishable articles, reduces the profits of hop-planters beyond what were derived from this branch of husbandry by those of former times. That most grievous and oppressive of all taxes, *tithe*, as it operates so powerfully in reducing the nett profits of a hop-plantation, ought also to deter new adventurers. Who, that reflects coolly on the subject, will, besides the first cost of forming the plantation, expend L. 20, perhaps L. 25, or L. 30 a-year on the culture of an acre of ground, when he knows that the tenth part of the produce is to fall to the share of the tithe-owner? The prospect of profit ought indeed to be great when liable to so great a deduction.

The cultivation of hops in a national point of view, is attended with considerable advantage,

as from ten to twelve *per cent.* on the gross value of the crop is paid to Government. This, when the crop is abundant, amounts to a very considerable revenue.

The chief uses to which hops are applied, have already been mentioned. It is said, that in Sweden, cloth of a very strong fabric is made from the rind or skin of the hop-binds. The method of preparing it, is somewhat similar to that practised in the management of flax and hemp, which will be explained in the following sections. Should this practice ever be introduced and adopted on a large scale in Great Britain, or should a method be found out, whereby hop-binds could by a simple process, and at a small expence, be converted into paper, hop-plantations may then be extended with a probability of success; but under the existing circumstances, it certainly would be improper, as the measure could not fail to be against the interest of every individual at present concerned in hop-grounds, while there seems no good reason to expect that the nation or the new adventurers would be benefited.

S E C.



## SECTION II.

*The Culture of Hemp.*

ALTHOUGH Pliny takes notice of hemp, in his Natural History, and mentions particularly the making of sail-cloth, cordage, &c. from flax, yet he says nothing about hemp being used in the same way. Hence it may be inferred, that the ancients were strangers to the valuable purposes to which it might be applied.

Hemp is cultivated to a greater extent in almost every other kingdom in Europe, than in Great Britain; and in Russia, probably, more than in any other, as it is from that kingdom that the British merchants and manufacturers are chiefly supplied.

Hemp, it is believed, has scarcely ever been cultivated in the open fields in Scotland; at least, in all the course of the writer's travels through various districts, he never saw any, excepting some small patches in cabbage-gardens, belonging to poor people. In England it is very different: He has seen fields of several acres under hemp, in the counties of Suffolk, Cambridge, and Lincoln; and a considerable quantity of it is also cultivated in Dorset, Worcester,

cester, and some other districts. It therefore becomes necessary and proper, to class this plant among the productions of the British soil.

The soil which produces hemp in the greatest plenty and perfection, is a deep free loam. It is, notwithstanding, frequently cultivated on soils, that have a considerable portion of clay in their composition.

A complete summer-fallow is considered, in some districts, as necessary, previous to sowing hemp; but the more general practice is, to sow it after some white-corn crop. In the latter case, the land, for the most part, receives three ploughings; one in the end of harvest, immediately after the preceding crop has been removed; one early in spring; and the third, before the seed be sown. Before the last ploughing, dung, (an article which, in hemp-husbandry, is regularly applied), is laid on, at the rate of sixteen or twenty cart-loads; each load drawn by three horses.

The ordinary hemp-seed time, is from the end of April to the end of May; but the end of April, or beginning of May, are found, from experience, to be the best seasons; as when the seed is early sown, the crop acquires greater strength, and is consequently better able to undergo the various operations of watering, grassing, breaking, &c. all which must necessarily be performed,

performed, before it be put into the hands of the manufacturer.

The usual quantity of seed allowed to the acre, is from two to three bushels; two and a half may be considered as the common allowance to soils of ordinary quality.

It has been formerly remarked, that hemp is sown on fallow, and also after any sort of white-corn crop. It may be further observed, although it will no doubt appear remarkable, that it is frequently cultivated on the same field for ten, fifteen, and sometimes twenty, and Mr Young somewhere says seventy years together, without any other sort of crop intervening; at the same time, from the circumstance of its having been found necessary to manure the land every year, there can remain no doubt of its being a robbing crop.

When the seed is sown, and the land properly harrowed, the crop requires no further attention, till it be ready for pulling; it being one peculiar property of this crop, that, owing to its completely covering the surface, it destroys weeds of every description.

In cultivating hemp, it is particularly necessary to attend to one circumstance, namely, that there are two kinds always in the same field; the one called the male, and in some places the fimble, hemp, which is barren, and the female, which carries seed. These two kinds become  
ripe



ripe at different periods; the first in the month of July, the other not till September. Some cultivators of hemp pull both sorts together. This practice is obviously wrong; as pulling the seed-bearing hemp nearly two months before it comes to maturity, must materially injure the crop, both to the farmer and consumer; to the former, by lessening the quantity, and to the latter, by injuring the quality, and thereby rendering it less durable. Accordingly, in those districts where the proper management of hemp is best understood, the male stalks, or those that do not bear seed, are drawn out, when the colour changes, and becomes a pale yellow; by which time, a few of the leaves begin to drop off. The female hemp is allowed to remain till it assume the same appearance, when, if it be not intended to preserve the seed, it is also drawn. When the preservation of the seed becomes an object, the crop is allowed to stand, till, by inspecting the seed, it be found to have arrived at a proper state of maturity.

The stalks of hemp and flax, in place of being mown, or cut with sickles like corn, are drawn out by the roots, with the hand. The expence, like that of all other agricultural labour, is very variable, and very different in some districts from what it is in others. In some places, pulling an acre of hemp costs nineteen or twenty shillings, while in others, the operation is per-

formed in as complete a manner for twelve or thirteen.

The management of a crop of hemp is also different in different districts. In some it is what is called dew-ripened. In others, it is immersed in water, immediately after being pulled. In the former case, the new-pulled hemp is carefully and thinly spread, either on a stubble field, or on some old pasture-land, where the grass is not apt to grow luxuriant. In this situation it remains, being however frequently turned, for five or six weeks, or till the reedy or woody part of it become so brittle, that, by means of the breaking machine, constructed for the purpose, it is made to part from the rind, or hempy substance. It is then taken up, tied in bundles, and either stacked, or carried home to be manufactured, in the manner to be after described.

The other method of managing hemp after it is pulled, is, to tie it up immediately in small bundles, and thereafter to put it into ponds of stagnating water, where it remains for five or six, or more days, according to the state of the weather; after which it is taken out, and spread in the manner already mentioned. This last method, which is most commonly followed, is adopted in order to shorten the process of grassing, and which both hemp and flax must undergo, in order to make the rind, or what is frequently

quently called the harl part from the reed or stalk, as no other method has yet been discovered, by which this can be so well effected. The immersing hemp or flax for some time in water, is the best mean that can be used, not only for making the harl separate more easily, and more completely, from the reed, but also for rendering less violent means, in breaking and scutching, necessary for effecting that purpose. A very tedious and expensive process, in bleaching the yarn, when it is to be converted into any of the finer articles of manufacture, is also by this means greatly shortened, and consequently becomes less troublesome. For these reasons, hemp managed in the manner last mentioned, always sells for eighteen-pence or two shillings the stone higher than that which is dew-ripened.

When it is proposed to save the seed, the crop of hemp, after being pulled, is bound up in sheaves, or bundles, and set up in shocks, for eight or ten days, by which time, in good weather, the seeds become so dry and firm, as to be easily thrashed out, which is done with a flail, and, for the most part, on cloths in the field. After the seed is thrashed out, the hemp is either spread directly on some adjoining field, or laid in water, as one or other of the methods of management above described be adopted.

After the hemp has been taken up from the grass, men are employed to break it, with a clumsy



clumsy machine, nearly similar to those formerly used in Scotland for breaking flax. It is then swingled or scutched, so as to make the reedy substances part from the skin or harl. These operations performed, the farmer's labour ceases, and that of the manufacturer commences.

It is worthy of remark, especially for the information of an English reader, that although the method of breaking and scutching flax in Scotland, about thirty years ago, was the same as above mentioned, yet that now, in almost every district of that kingdom where flax is cultivated, proper mills, moved by water, are erected for the purpose. The breaking is performed very completely, by passing the flax, in small handfuls, once or twice between two large fluted wooden-rollers; and the scutching, by scutchers fixed to a large horizontal wheel, which moves with great velocity. After the flax has been broken, by passing once or twice between the rollers, the millers hold first one end of the bunches, or handfuls, to the scutchers, and then the other; by which means, all the reedy part, provincially the "shows," flies off, and the flax is rendered fit for the merchant or the manufacturer. Considering the great additional price of labour in England, beyond what it has yet arrived at in Scotland, it is surprising that, in those districts in the former kingdom, where so much hemp and flax is annually cultivated, none of these

mills have hitherto been erected. Where the rate of manual labour is so high, and the demand for labourers so great, every proper mean should be used to keep the one within proper bounds, and to render the other less pressing; and no measure, it is well known, is better calculated to furnish immediate relief in either case, than erecting simple and well-constructed machinery.

The average-produce of a crop of hemp, when made ready for the heckle, in which state it for the most part goes out of the hand of the cultivator, is from thirty-eight to forty stone, of fourteen pounds to the stone. The price, besides a bounty allowed by an act of Parliament passed in the year 1782, is from 7s. to 8s. the stone. The ordinary quantity of clean seed produced on the acre, is from eleven to twelve bushels, and the price from 4s. to 5s. the bushel.

Hemp is frequently sold on the ground when ready for pulling. When it is disposed of in this manner, the price is seldom under L. 6 the acre, and rarely exceeds L. 8. If ever the cultivation of hemp becomes general in these kingdoms, which, however, in the writer's apprehension, is extremely doubtful, there is no period at which the farmer can dispose of the crop with greater advantage to himself, or to the community, than immediately before it be pulled. By selling it at that period, he is relieved from the performance of all these tedious and harassing operations, which

which are necessary afterwards to be attended to, before it can be made fit for the market. Many of these, as they fall to be performed during the busy season of the year, it is difficult, often impossible, for the most active farmer to accomplish, without neglecting other matters, on a proper attention to which, his own and his family's interest more immediately depends.

When crops of hemp or flax are disposed of before they be pulled, the poor people in the neighbourhood, whose time is not fully occupied, are greatly benefited. They, in general become the purchasers, and as they water, grass, break, scutch, and heckle it themselves, and for the most part spin it into yarn before they offer it for sale, they are by that means furnished with several months employment, while the surplus price of the manufactured commodity affords them full compensation for their labour.

The hemp cultivated in England, which is considered superior in quality to any imported, is converted to many useful purposes, as shirting, sheeting, table-linen, sail-cloth, pack-thread, fishing-nets, and cordage of all sorts.

Notwithstanding the average-value of a crop of hemp by the acre is as above stated, and that the bounty allowed by Government amounts frequently to 15s. or 20s. the acre, yet the cultivation of it does not seem to increase. The very minute attention requisite in the management of it,



it, from the time it is ready for pulling, till it be put into the hands of the manufacturer; the expence of labour, compared with the gross produce, great as it is; the difficulty of procuring labourers at the periods when the most tedious operations fall to be performed; added to the immense quantity of manure which must be annually applied; will, in all probability, deter the British farmers, especially where the crop cannot be sold before pulling, from cultivating hemp on a large scale. It may indeed be cultivated with advantage to the farmers, and the culture of it prove beneficial to the peasantry in some populous districts where the labouring classes are not fully employed, provided they become the farmers merchants. But, in a national view, it is by no means clear, considering the situation Great Britain has been in for a number of years, respecting bread-corn, that the cultivation of hemp ought to be considered a lucrative branch of British husbandry. The writer's reasons for holding this opinion will be more fully explained in the conclusion of the following section. It is only necessary here to observe, that this opinion he acknowledges is different from that of many who have before written on the subject of British husbandry; but the difference arises from the change of circumstances. Formerly the balance of the corn-trade was in favour of this country, a much greater quantity being export-

ed in a course years, than in some particularly unfavourable seasons it was found necessary to import. Now the case is greatly altered. It has been ascertained by high authority, (the King's Privy Council), that for a course of years, the crops raised in Great Britain, were not in ordinary seasons by any means sufficient for the supply of the inhabitants.

## S E C.

## SECTION III.

*The Culture of Flax.*

ALL writers on husbandry, both ancient and modern, agree, that flax is a robbing crop, and that it exhausts the soil to a great degree.

Flax, Pliny says, was cultivated, in his time, chiefly for the purpose of making sails and cordage for ships. He expresses himself to this effect :  
“ What greater miracle, than that there should  
“ be a plant that makes Egypt approach nearer to  
“ Italy :”—“ That there should grow from so  
“ small a seed, and upon so slender and short a  
“ stalk, that which, as it were, carries the globe  
“ itself to and fro.” He also informs us, very particularly, of the process of flax-husbandry, as then practised in Italy, where that plant, as well as hemp, is still cultivated to a great extent. The farmers, he says, knew when the crop was ready, by two marks, namely, the swelling of the seed, and the stalks becoming of a yellow colour towards the roots. When ripe, it was pulled, bound into small bundles, and dried in the sun. It would appear, that, in the course of drying, the seeds, owing to the great influence

of



of the sun, dropped off naturally. The stalks, after being freed from the seeds, were steeped a certain time in water; the period they should remain, in this situation, was determined by the bark or harl, which is the flaxy substance, parting easily from the boon or woody part of the plant. When, by trial, it was found to have arrived at that state, it was taken out of the water, and, after being dried, was bruised or broken on a stone with a mallet, and afterwards combed in iron-heckles, till it was entirely freed from the boon; and, in the course of combing or heckling, the most valuable was separated from that of inferior quality. In a word, the method of managing a crop of flax in Pliny's time, and in the country where he resided, was not very unlike that which is now practised in Great Britain.

This author mentions two very extraordinary kinds of flax: The one, which he says grew in the torrid sands of India, that would not burn with fire; and the other, as being of a remarkable fine and strong quality. Tablecloths were made of the former, some of which he had seen thrown into the fire as they were taken from the tables after an entertainment, and which were thereby cleaned better, and made brighter than could have been done by water\*. The other kind

\* Such cloth is still made for curiosity, from the *asbestos* or earth flax. What Pliny had seen was probably of this sort.

kind was made into snares for catching fishes and birds, which, he tells us, were so strong as to entangle bears, and also so hard as to resist the edge of a sword, while, at the same time, they were so fine, as to pass, together with the ropes at the upper and under sides, through the ring of a man's finger.

The soil most proper for flax, is a deep free loam, such as is not apt to be overcharged with moisture, nor, in ordinary seasons, to become too dry. Flax is sown after all sorts of crops, but is found to succeed best on lands lately broken up from grass. In Scotland, the most skilful cultivators of flax generally prefer lands from which one crop of grain only had been taken, after having been several years in pasture. When such lands have been limed or marled, immediately before being laid down to grass, the crop of flax seldom or never misgives, unless the season prove remarkably adverse.

In regard to the choice of seed, that which is of a bright brownish colour, oily to the feel, and, at the same time, weighty, is considered the best. Lint-feed, imported from various countries, is cultivated in these kingdoms. That brought from Holland is in highest estimation, as it not only ripens sooner than any other that is imported, but also produces greater crops, and flax of that quality which best suits the chief manufactures of the country. American seed produces, in common, fine flax, but neither the quantity of  
flax,

flax, nor of the pods, provincially the "bolls," which contain the seeds, is so large as the produce from Dutch lint-feed. Riga seed yields a very coarse sort of flax, but a greater quantity of seeds than any other.

It is common in some parts of Scotland to sow seeds saved from the crop of the preceding year, especially when that crop was raised from seed imported from Holland. The success of this practice is found to depend greatly on changing the seed from one sort of soil to another of an opposite nature; but the saving in the expence of purchasing that sort of seed, in place of what is newly imported from Holland, is so inconsiderable, and the risk of the crop misgiving so much greater in the one case than in the other, that those only who are ignorant of the consequences, or who are compelled from necessity, are chargeable with this act of ill-judged parsimony.

The quantity of seed used, varies; from two bushels, to two bushels and a half, the English statute-acre, is the ordinary allowance. In determining the proper quantity necessary for the acre, it is requisite to pay great attention to the condition of the land. When the land is rich and fertile, and the season so favourable that it can be got thoroughly pulverized, if too much seed is sown, the crop is in great danger of lodging, and when that happens, particularly before the pods are formed, the flax proves incon-



siderable in quantity, and very inferior in quality.

The ordinary season of sowing flax-seed is from the middle of March to the middle or end of April, but the last week of March, and the first ten days of April, is esteemed the best time: and, accordingly, within these periods, the greatest quantity of flax-seed is sown in both kingdoms.

Flax, when young, is a very tender plant, and is more easily injured and checked in its progress by weeds than any other that is usually cultivated in the fields. For this reason, it is indispensably necessary, in order to secure a good crop, either to prepare the land very carefully, by repeated ploughings and harrowings, and by carrying off or burning the weeds, before sowing the seed, or to be at the expence of a troublesome and tedious hand-weeding afterwards. When the latter method of cleaning the land is adopted, the operation should be performed when the flax is about three or four inches high, and all the weeds ought to be carefully picked up, and carried off the field. When flax is cultivated by the cottagers and the poorer tenants, who possess not the means of cleaning and preparing the land in a proper manner before sowing the seed, weeding in such cases becomes an arduous task. Women are always employed; they generally sit or lie down and pick out every weed they see. If the value of time were considered,

sidered, or the price of labour ascertained, the tedious and expensive mode adopted for weeding flax, when cultivated in small quantities, would deter any sensible person from the attempt; in some counties in England, where the price of labour is extremely high, the expence of weeding an acre of flax, if performed in the same tedious way it is done in some parts of Scotland, would cost 30 s. or 40 s. the acre; and with the expence of the other requisite labour, would amount to fully a half of the gross value of the crop.

When flax is cultivated by farmers on a large scale, the lands being under a regular course of cropping, and properly cleaned and pulverized before the seed is sown, the business of weeding, if at all necessary, is performed by few hands, in a short space of time, and at little expence.

Those who usually cultivate flax have several marks by which they determine, with considerable accuracy, when it is ready for pulling. That which is the most obvious, is its changing from a green to a brown, or rather yellow colour; when this alteration in the colour becomes discernible, the crop should be pulled without loss of time.

A crop of flax frequently grows short, and runs out a great number of seed-bearing branches. When that is the case, the seeds, not the flax, ought

ought to be the farmer's chief object; and the crop should be allowed to stand till the seeds are in a great measure perfected.

When the crop thrives, and is likely to become more valuable for the flax than the seeds, it should be pulled soon after the bloom drops off, and before the pods turn hard and sharp in the points.

In pulling flax, it is usual, when it is intended to save the seeds, to lay it in handfuls, partly across each other; the reason for which, is, that the business of rippling is thereby facilitated, as the ripplers, in place of having to separate each handful from the bundle, find it by this simple precaution, already done to their hand.

Although it is of much importance, yet it very seldom happens, that much attention is bestowed to separate the different sorts of flax from each other, in pulling the crop.

In most fields, there are varieties of soils; of course some parts of a field will produce fine flax; others coarse; some long, and some short: in a word, crops of different lengths and qualities. It cannot be supposed, that all these sorts of flax will undergo an equal degree of watering, grassing, breaking, and heckling, without sustaining great injury. Therefore, when flax of various qualities is promiscuously mixed together in pulling, it is impossible to prevent



prevent some part of it from being lost in the after-management; a loss which might be avoided with a small share of attention, and some additional trouble when the crop is pulled. Those who rent flax-mills are often blamed for embezzlement; but there is great reason to believe, very unjustly. Because the crop of a particular part of a field yields such a quantity of flax from one mill, it does not follow, that the manager of another mill should return an equal quantity from the same space, probably, of very inferior land. It is certain, in very many cases, that the inattention of flax-farmers to the above very necessary precaution, is the cause why crops of flax often turn out of so little value, and is the principal reason why the proportion of tow or inferior flax so often exceeds in ordinary seasons that of superior quality; the millers and hecklers being obliged, in the course of their operations, owing to the mixed state in which they receive the crop from the grower, to reduce the quality of the whole to a lower standard than there would be any occasion for, were the different qualities sorted, and put into their hands in that state.

After the crop is pulled, the pods containing the seeds are forced from the stalks by means of an iron-comb, called a ripple, fixed on a beam of wood, on the ends of which two persons sit, who, by pulling the seed-end of the flax repeatedly

peatedly through this comb, execute the business in a very complete manner. When the flax is rippled, which is always done immediately after it is pulled, it is tied in small bundles, and put into pools of stagnating water, where it is allowed to remain several days, according to the natural warmth of the water. As soft clear stagnating water has been found by long experience to be superior for the purpose to any other; where that cannot be obtained without art, a pit or canal is commonly formed, adjoining to a river or stream, whence water can be easily brought. This pit or canal is filled with water for some time, a week or two, before it be proposed to pull the flax; by this means the water acquires a greater degree of warmth than river-water possesses, and which contributes greatly to facilitate the object farmers have in view in immersing green flax in water, namely, to make the harl or flaxy substance part easily and completely from the boon.

The period that flax ought to remain in the water, depends on various circumstances; as the state of ripeness in which it was pulled, the quality and temperature of the water, &c. The most certain rule by which to judge when flax is sufficiently watered, is, when the boon becomes brittle, and the harl separates easily from it.

Although

Although it is the general practice where flax is cultivated in Great Britain, to immerse it in water for some time after it is pulled; yet in Dorsetshire, and in that neighbourhood, it is seldom done. There the flax is allowed to arrive at that state in which the harl parts most easily from the boon, by a more gradual process, that of dew ripening, which was described when treating of the management of hemp. This, it will be observed, is nothing more than exposing the flax to the influence of the weather, for a longer period than is necessary when the operation of watering has been previously performed.

Sometimes, if the steeping be judged sufficient for effecting the separation of the harl, little more is done, than putting it up in parcels, or spreading it on the ground to dry. After steeping the flax, the only other operation which properly falls under the farmer's attention, is grassing it. It is commonly spread very thin on the ground, and in regular rows; the one being made to overlap the other a few inches, with a view of preventing, as much as possible, its being torn up and scattered by gales of wind. Old grass ground, where the herbage does not grow to any great height, is the best for the purpose; as, when the grass or weeds spring up so as to cover the flax, it is frequently rotted, or at least greatly injured thereby. Flax is allowed to remain on the ground till, by repeated



peated trials, it is found that the boon has become very brittle; so that, on being broken, and rubbed between the hands, it easily and freely parts from the harl. It is then taken up; a dry day being chosen for the purpose; and, being bound in sheaves, is either sent directly to the mill, which is the usual practice in Scotland, or in England broken and scutched, in the manner they do hemp.

Those who bestow most attention on the cultivation of flax in Scotland, generally ripple off the seed, even when there is no intention of saving it; as it is found, when flax is put into water without taking off the pods, the water soon becomes putrid, in consequence of which, the flax is greatly injured.

When it is proposed to save the seeds of flax, the pods are carried home from the field, so soon as they are separated from the flax; and either laid on cloths, and exposed to be dried by the influence of the sun, or they are spread on barn floors, and turned two or three times a day, till they are so dry, that the seeds can be easily thrashed out in the ordinary way. This is the general mode adopted in Scotland. In Dorsetshire, they allow the flax to lie on the field after it has been pulled, till the pods become so dry, that the seeds can be thrashed out with a stick; and which is done on a board, or log of wood, placed on the field for the purpose.

The

The quantity of seed produced on the acre, English measure, is from six to eight, sometimes as high as ten or twelve, bushels. The price depends, in a great measure, on that of foreign seed imported; as, when sold to oil-makers, the price is generally about one half of that of Dutch seed sold for the purpose of sowing. The price of home-cultivated lintseed is considerably advanced of late, in some of the southern and western counties of England, beyond what it is in Scotland, owing to the circumstance of its being much used as food for fattening cattle; and which, when boiled to a sort of jelly, and mixed with malt-grains, chaff, or bran, is found to answer extremely well. The average price of the lintseed cultivated in these kingdoms at large, cannot be rated higher, than from three to four shillings the bushel. Oil-cake, or the refuse of the seeds of lint, hemp, and rape, after the oil has been expressed from them, is also a valuable article, as food for cattle, and much used in England; although, hitherto, but in small quantities in Scotland. The price varies in different districts, according to the demand; the general average may be, from L. 3 to L. 4 the ton.

There are few crops more variable, in quantity as well as quality, than flax. When sold before pulling, which is commonly the case in Scotland, when cultivated on a large scale, the

price runs between L. 6 and L. 10 the English acre; but L. 7, 10s. may probably be rather a high average.

It is usual for farmers, in different parts of Scotland, who rent lands in the neighbourhood of towns and villages, to let a field to the inhabitants, for the purpose of growing flax. This, for the reasons mentioned in the former section, is the most advantageous mode in which this crop can be cultivated. The rent affixed on the land, is about L. 3, 10s. or L. 4, the English acre, according to the quality; the farmer always undertaking to cultivate the land in a proper manner. The same practice, with a little variation, is also established in some parts of England: The farmer rents or lets the land, to a person who is denominated a middle-man, or flax-jobber, and whose business it is, to perform all the various operations after the seed is sown; which, as in the former case, is always furnished by the renter, the farmer having nothing more to do, than to plough and harrow the land.

On the principle, that it was politically right, by the use of every proper means, to prevent this nation from remaining in a dependant and precarious situation, in regard to a supply of hemp from foreign countries, the British Legislature deemed it proper, about thirty years ago, to offer considerable bounties on the importation of  
that



that article from the American colonies. Partly on the same principle, and with the view of establishing and encouraging manufactures, what may be called domestic bounties have been for some time given, as an inducement to increase the cultivation both of hemp and flax. To these bounties or premiums being still given, it is no doubt owing, that the culture of flax is so greatly increased in Scotland, and that hemp and flax are cultivated on so large a scale in several counties in England.

In certain situations, and under particular circumstances, it will be readily admitted as being highly proper, to hold out bounties for the cultivation of articles, the manufacture of which, may usefully and profitably employ a great number of people: At the same time, it may be contended, that circumstances may so much alter, as to render it equally proper to withdraw these premiums, by which the cultivation of them had been generally established.

When a country is thinly inhabited, so that the lands in tillage are more than sufficient for producing an abundant supply of corn; when manufactures are so much in their infancy, that the fostering hand of Government can alone extend or establish them; and when the great body of the peasantry are but partially employed; it must at all times, in such cases, be considered sound policy in the Legislature, and also in private socie-

ties to hold out such inducements as are most likely to effect an object so great, and so important, as the advancement of manufactures, and especially of those by which the raw materials produced in the country are converted into articles useful for domestic purposes, or valuable as articles of commerce. If full employment can be obtained for the labouring part of the community by means of the cultivation and manufacture of hemp and flax, without which foreign commerce cannot be extended, it is obvious that these, and such as these, merit the first regard; and that the Government of a country, in the state above described, could not possibly turn its attention to the establishment of measures better calculated to promote the public good. But, in Great Britain, in its present state, when its commerce and manufactures have arrived at an unexampled state of prosperity, and far outrun its agricultural improvements; when the people at large (those only in the more remote parts of the island excepted) are fully employed; when the population is so much increased, that we are told from the highest authority, that the inhabitants of this country are now reduced to the necessity of depending *for their very existence* on such precarious supplies of the most indispensable of all the necessities of life "bread-corn," as can be *annually* procured from foreign nations; in a word, when, if other nations were to refuse

us supplies of grain, (notwithstanding our boasted improvements in agriculture), numbers of the inhabitants would literally starve for want of food,—certainly the propriety of holding out bounties to those who divert the land from the most useful of all purposes, that of raising grain, at once disappears, and the practice, in place of being longer laudable or praiseworthy, becomes to the highest degree improper.

If the subject be considered with a view to the manufactures of the country only, and although to promote these, not to advance the agriculture of the country, these bounties were first held out, yet the policy of continuing to adopt the same measure under the change of circumstances that has taken place, is equally questionable. By what rule, it may be asked, can the rate of labour be accurately determined? not surely by the value of money; for, of all articles, that is the most fluctuating. The quantity of provisions which a labourer can purchase for his labour, is alone the true criterion by which to judge of the rate of labour. Taking this for granted, it follows of course, that to such an extent as the Government of any country, (where the lands in tillage are found from experience inadequate to supply the inhabitants with bread), continue to bribe the farmers to cultivate hemp and flax in place of grain, to the same extent they injure the manufactures; as wherever an annual importation of  
grain



grain is requisite, there the price must be higher than if a sufficiency were cultivated in the country for the use of the inhabitants, and as the difficulty of procuring food increases, so will the price of labour, and so far must the manufacturer be injured,

## CHAP.

## CHAPTER XIX.

*Orchards, and the Method of making Cyder and Perry.*

**A**LTHOUGH numerous, and in many places extensive and valuable, orchards, are to be seen in various parts of both kingdoms, yet the planting of apple and pear trees for the purpose of extracting liquor from the fruit, is confined to a few counties in the south and west of England. In the counties of Hereford, Worcester, Gloucester, Monmouth, Devon and Dorset, the greatest quantity of cyder and perry is made, and of these Hereford is entitled to rank first, both in respect of the extent of the quantity manufactured, and of its generally superior quality.

The aspect most commonly chosen for an orchard, where no circumstance interferes that renders it proper to prefer another, is towards the south, or south-east; and wherever this can be procured, with, at the same time, the further advantage of possessing a screen or shelter from  
the

the north and north-east winds, the situation is considered to the highest degree favourable. Orchards are formed, or which is the same thing, fruit-trees planted, on several sorts of soils; and which, if a remark, often made in the cyder districts, be well founded, namely, that different soils produce fruit different in quality and flavour, is a method highly proper, as the greater variety there is in the taste and flavour of the fruit, the more the cyder farmers have it in their power to make liquor of superior quality. Apple-trees are for the most part planted either on strong deep loams, or on such clays as by having a portion of gravel in their composition are not retentive of water. Pear-trees are found to thrive best on soils of a lighter nature, and are planted on almost every sort of soil where the under-stratum is dry, and so free as to admit the roots to spread out and penetrate to a proper depth.

It would be endless to enumerate all the various sorts of apples and pears common in these districts. Of the apples, the following are in the greatest esteem:

**The Stire.**

**The Golden Pippen.**

**The Hagloe Crab.**

**The Woodcock.**

**The Old Redstreak,**

**and**

**The Cockagee.**

**The**



The pears that are considered the most valuable, as producing some of them the strongest, and others the highest flavoured perry, are,

**The Squash.**

**The Barland.**

**The Sack.**

**The Huffcap.**

**The Old Field,**

**and**

**The Red Pear.**

Many of the orchard-trees in the cyder countries have been grafted on crab-stocks, in the manner usually practised in the other parts of Great Britain; but the more general practice is to graft on stocks raised from kernel fruits. In the mode of sowing the seeds, and managing the seedlings, nothing occurs worthy of particular remark. The nursery-man's attention is chiefly devoted to procure strong, vigorous, handsome, plants, and to train them as straight and upright as possible.

In regard to the distance at which the stocks are planted from each other, it is necessary to observe, that in all the fruit districts in England, there are what may be called two sorts of orchards: the one, and to which that term more properly belongs, is an allotment of ground set apart principally for the growth of fruit trees,

and, as in Scotland, they are planted so close to each other as to leave no more room than is sufficient for allowing them to attain a proper size, without encumbering each other, or preventing a free circulation of air. The other may more properly be denominated a fruit field, as the trees are planted at such distances as not, in any material degree, to obstruct the tillage, or, but by the falling of the leaves in autumn, to injure the pasture. In the orchards, properly so called, from thirty to forty trees are commonly planted on the acre. In the fields, seldom more than ten or fifteen\*.

The stocks are planted out into the orchard, or field, when eight or nine years old, by which time they generally measure four or five inches in circumference, at three or four feet from the ground. The ordinary seasons of planting are the latter end of October and the beginning of March; the one or other being made choice of as best suits the nature of the soil, and the convenience of the farmer, but is probably more generally regulated by what is the established custom of the particular district, which, in matters of this kind, has generally a great effect on the conduct of individuals.

When

\* Some farmers in Herefordshire possess fruit fields of thirty or forty acres, and, in favourable seasons, make four or five hundred hogheads, containing a hundred and ten gallons each, of cyder and perry.

When trees, or what are called stocks, are planted out, especially in a field that is kept either occasionally or for the most part in tillage, it is usual to place them in regular rows, so as not to impede the ploughing, or endanger the trees by carrying on the other necessary operations. After the stocks have been two or three years planted in the field, and have acquired a firm hold of the ground, they are grafted. There are various ways of performing this operation: That which is most common, is, to saw off the head of the stock, and, after making two or three transverse cuts, or openings, in the top of the stock, the grafts are inserted, and thereafter secured with a paste made of clay, or other soil of a tenacious nature.

Although it is by no means a common practice, with those who possess extensive orchards, or fruit fields, to pay much attention to the training or proper management of trees, from the time they are grafted, till they arrive at such an age as to bear fruit, which is in about five or six years, yet there are numerous instances where the contrary is the case. Many farmers are careful to train the trunk in an upright position, to take off all the decayed and useless wood, and to protect them by proper rails, and by other means, from being injured by cattle.

It was mentioned, when describing the manner in which the lands of Great Britain are occupied, that the soil of the orchards was sometimes



times in tillage, and sometimes in pasturage. The mode of managing the orchard-fields does not vary in any material degree from that adopted in the other parts of the district where no trees are planted. In some places the ground is allowed to remain constantly in pasturage; in others it is as constantly kept in tillage; while in others, again, it is occupied in the production of alternate crops of grain and grass: the prevailing practice in the district, more than any other circumstance, regulating, in general, the mode of occupation. In the close-planted orchards, whether in England or Scotland, the land is almost, in every instance, allowed to remain in grass.

In all the cyder counties, there are three sorts of fruit-liquor usually made; as, cyder from apples, perry from pears, and another sort, called cyder also, from a mixture of apples and pears. The method of making cyder and perry is so exactly similar, except in some of the concluding processes, as that of fermentation, racking, &c. that one description is sufficient.

It rarely happens, unless when the former year's stock of cyder is expended, (for in the fruit districts cyder is the common beverage of the working people), that the farmers begin to gather the fruit till they have unquestionable proof that part of it at least is ripe, by its beginning to fall spontaneously from the trees. When that happens, the general fruit-harvest commences; and al-

though there are different modes of gathering the fruit, the most common is, to employ men with long poles to shake and beat off the fruit from the trees, while women attend with baskets to gather, and put it into carts to be carried home. Another, and a better, method, both for the fruit and the trees, is to take at first such of the fruit only as has either fallen spontaneously, or that can be forced from the tree by gently shaking it. The remainder is then allowed to remain till it arrives at a greater degree of maturity, by which means the loss and inconvenience arising from mixing fruit in different stages of ripeness is prevented, and less injury is done to the tree.

After the fruit is brought home, it is laid in large heaps, sometimes in the open air, and sometimes in sheds erected for the purpose. It is allowed to remain in these heaps in order to mature and become mellow, before it is put into the mill; and which is rendered the more necessary, in consequence of the common practice of mixing the ripe and unripe fruit together. It is, however, attended with one disadvantage, as it often happens, that the ripest and best of the fruit begins to rot, before the heap at large has acquired that mellowness which it ought to possess before the operation of grinding commences. A few farmers, more judicious than the others, sort the fruit as it is gathered, according to the  
different

different degrees of ripeness, making sometimes three or four divisions. Others, again, keep the different sorts of apples in separate heaps, and only mix such sorts, and those in such proportions, as they know, from experience, will answer best. It is evident, that liquor made from fruit so managed, must be greatly superior in flavour, colour, and quality, to that made from fruit managed in the manner first described.

After the fruit is laid in heaps, it is allowed to remain in that state a shorter or longer period, according to the season, and to the state of the weather; but the general practice is, not to begin grinding till the seeds, on some of the fruit being cut through, appear black, or of a dark brown colour, or till some of the ripest is beginning to rot.

When the fruit is arrived at what is considered a proper condition for grinding, it is carried to the mill, without any farther precaution being in general used, than taking out any of the fruit that is completely rotten.

The common cyder-mill is constructed on similar principles with those erected for breaking bark, or bruising whins. The millstone, or runner, about three or four feet in diameter, and from a ton and a half to two tons weight, is moved by an axle, passing through the centre, and extending over the bed of the mill, for a horse to draw by. The other end of the axle enters an upright



upright shaft, or post, which has a circular motion, by means of pivots, the one fixed in a beam or rafter of the mill-loft above, and the other in the centre or bed of the mill below. The trough or chase, in which the millstone moves, is made of stone, about ten inches deep, and the same breadth at bottom; the stones, which form the side next the centre of the mill, are placed perpendicularly, and made to answer exactly the circular course of the millstone. The outside stones are placed slopwise, so that the trough is seven or eight inches wider on the outside of the millstone at the top than at the bottom. This gives room to feed it in occasionally under the millstone, when grinding, and to take out the ground fruit, provincially called the "must."

The method of grinding is, to put from three to five bushels of fruit into the trough or chase at once, and to keep the mill constantly going till the whole including rinds and kernels, be reduced to a soft pulpy substance. The more completely this is effected, the better is the liquor; the colour, taste, and flavour, being all greatly improved, when, by properly grinding the fruit, the essence of the rinds and kernels is extracted, as well as the juice of what the cyder-farmers and gardeners call the "fleshy" part of the fruit.

The operation of grinding is not very tedious, except when more than ordinary trouble is bestowed,

flowed, it being common to grind from fifteen to twenty mill-fulls in a day. When the mills are of the middle size, three hogsheads of perry, or two of cyder, are usually made in the day; and when a farmer, as often happens, has three or four hundred hogsheads to make in a season, the work is carried on with still greater expedition; but then it is not performed in the most approved manner, little more being done than grinding or bruising the fleshy part of the fruit, without reducing the rinds or kernels to a proper state for extracting their qualities.

When the fruit is so completely ground as to be reduced to a kind of pap, it is taken out of the trough; and, for the most part, put into a large vat, placed near the mill for the purpose, where it is allowed to remain for a day or two, or till some signs of fermentation be observable. When, by these signs, it is known to be ready for pressing, that operation is performed in the following manner: A frame of wood, about three feet square, and three or four inches deep, being placed on the bed of the press\*, a piece of hair-cloth is spread over it, and part of the "must," in some places called the "cheese," being taken out of the vat, is put within the cloth in the frame; when the frame is carefully and evenly filled

\* The cyder-press is worked by a screw and nut; and is in every respect similar in principle to those used at oil-mills, and by packers, pressers, bookbinders, &c.

filled with must, the edges of the haircloth are folded neatly over it; the frame is then raised up till the under-edges are equal to the top of the first-formed layer; and another haircloth being laid over the frame, it is filled in the like manner; and the work thus proceeds, till the pile rises to the height of thirty inches or three feet.

Over the pile, when finished, is laid a square frame of strong boards, on which are placed some blocks of wood, for the purpose of raising the pile as high as the cross bar of the press. The power of the press is then applied; and the liquor being leisurely expressed, runs from the bottom of the press into a reservoir, placed at a little distance, to receive it. The pressure is increased in proportion as the liquor is extracted; and at last the refuse becomes so hard and arid, as to be incapable of yielding any more. It is then taken out of the press; and in years of plenty, thrown to the dunghill; but when scarcity prevails, it is ground and pressed a second time, being previously mixed with water, or with the first runnings from the press, which generally come off thick and muddy.

Cyder and perry, like all other vinous liquors, undergo fermentation; and greater skill and attention are requisite to conduct them properly through this process, by which chiefly their im-



purities are thrown off, than in any other branch of the business of cyder-making.

The liquor is sometimes allowed to stand in large open vats, till it has done fermenting; but more generally it is put into large casks and hogheads directly from the press.

In respect to the commencement, continuance, and degree of fermentation, which these liquors pass through, nothing is more uncertain. No artificial means being used to bring on fermentation, the period of its commencement must depend on various circumstances; as, the state of the weather, the ripeness and maturity of the fruit whence the liquor had been extracted, the size of the cask and the quantity of liquor, whether in an open vat or tunned up in hogheads, &c. On these depend also the continuance and degree of fermentation. In general, it commences the first, second, or third day, and continues for two or three, frequently for four or five, according to the degree of fermentation which is excited. If the liquor be agitated, by being carried from one place to another at a considerable distance, the degree of fermentation that succeeds is more violent, and sooner over than when liquor of the same quality is allowed to remain undisturbed in the place where it is put when carried from the press.

At

At a certain stage of the fermentation, the liquor is racked off into other casks. When this operation should be performed, so that the greatest possible advantage may be derived, is a point hitherto undetermined. Every person, acquainted with the art of cyder-making, agrees, that there is a critical period at which the liquor should be racked ; but in practice, the signs attended to as indications of the approach of that period, are as various as can be supposed. The usual method, however, is to begin racking cyder, when the froth or scum which had risen to the top during the fermentation and agitation of the liquor, has formed into a firm brownish kind of crust. Perry is commonly racked, before the fermentation subsides so much that the liquor leaves off making a hissing noise, which it always does in proportion to the violence of the fermentation.

Owing to the various sorts and qualities of liquors made \* ; to the different degrees of ripeness to which the fruit is allowed to arrive ; and to the mixture of fruit of different or opposite qualities ; it would be difficult, perhaps impossible, to lay down specific rules to direct the cyder-maker, in regard to the best mode of conducting

\* There are three sorts of these liquors very commonly made ; they are distinguished by the names of the rough, the sweet, and the rich or generous.

ducting the process of fermentation, or to point out the particular period, when, from the extent to which the fermentation has proceeded, it is time, in every particular case, to endeavour to put a stop to it, by racking the liquor into another vessel. It, however, seems generally agreed, that the proper time for racking either cyder or perry is between the period when the thickness or foulness, caused by the fermentation, subsides, and that of the falling of the froth or brown crust from the top; by that time, the liquor has acquired a greater degree of fineness than it can possess at any after period, while it remains in the first cask, as all the settlings have attached themselves, either to the top or the bottom of the vessel.

Racking is nothing more than drawing off the clear liquor from one cask, and putting it into another properly seasoned, and is done by tapping the cask pretty high, so that the clear liquor may be drawn off without any mixture of lees or settlings.

The liquor, with which the scum that was on the top, and the stuff that had settled at the bottom, is mixed, is then drawn off, and drained through a bag or cloth, and afterwards mixed in the new cask with that which had run off fine, and to which it is said to be superior in colour, and in another peculiar property, namely, in possessing a power of preventing, or at least



least of lessening, the extent of further fermentation; a circumstance which frequently takes place, after all the attention that can be bestowed to prevent it.

When the liquor is racked, if no after fermentations render other rackings necessary; or if a failure in the strength, colour, or flavour, require not some extraordinary treatment; the process of cyder-making, so far as the farmer is concerned, may be said to be completed, as nothing more is necessary than to bung up the casks, which is never done sooner than two or three months after the liquor is for the last time racked off.

The quantity of cyder and perry made for sale in the fruit districts, is very great; but that used by the inhabitants, is by all accounts much more considerable.

These liquors are sold by the farmers in different states of preparation for market. Sometimes they are sold immediately from the press; sometimes after the first racking; and frequently, not till ready for use.

The price of cyder and perry always advances, according as these liquors are in a prepared state for the consumer's use, as well as according to the quantity on hand, and the quality of the fruit whence it was made.

Stire cyder, and squash-pear perry, for instance, always give much higher prices than  
what

what is made from any other sorts of fruit. The price of common cyder liquor, from the press, for a course of seven years, may be rated at from 15 s. to 30 s. the hoghead of 110 gallons; and common perry, from 12 s. to 15 s. Stire cyder, in the same state, sells for L. 5, L. 10, and sometimes L. 15 the hoghead; and squash-pear perry, in ordinary seasons, from L. 4 to L. 8. \*

The produce of cyder or perry, by the acre, can only be guessed at, by first ascertaining the number of trees. From an orchard of trees, in full bearing, half a hoghead of cyder may, in seasons ordinarily favourable, be expected from the fruit of each tree. As the number of trees on the acre varies from ten to forty, the quantity of cyder must vary in the same proportion, that is, from five to twenty hogheads. Pear-trees, in equal good bearing, yield fully one-third more liquor; therefore, although the liquor extracted from pears, sells at a lower price than that produced from apples, yet the value by the acre, when the number of trees is the same, is nearly on a par.

Notwithstanding there are many individuals in the cyder-districts, who evince much care and attention in the management of their orchard-grounds, trees, fruit, liquor, &c. yet this is by no means the common case; on the contrary, such general negligence prevails, and so imperfect are the modes in which this branch of husbandry

bandry is for the most part conducted, that many are of opinion, so much valuable land being occupied as orchards, is, in a national view, extremely unprofitable; and that, owing to the same causes, want of attention, and adopting improper modes of management, the farmers at large are also injured, rather than benefited. While orchards continue to be considered as secondary objects only, of the farmer's attention, as is the case at present, it can hardly be expected, that the produce will be abundant, or the quality such as to recommend it to more general notice. In place, however, of condemning orchard-husbandry at large, it appears much more correct to recommend a general reform in the management; whereby liquors, that are both wholesome and agreeable, when well made, may be introduced into more general use, and so large an importation of foreign vinous liquors rendered unnecessary.

In place of planting only ten or a dozen of trees on the acre over an extensive tract of land, it would be more for the interest, and certainly much more convenient, for the cyder-men, were they to allot a few acres, adjoining to their places of residence, for the sole purpose of growing fruit-trees. The loss and inconvenience of having fruit-trees scattered over an arable field, are considerable. When the trees are full grown, they overshadow, and consequently greatly injure,



jure, the crop below ; the roots also spread to a great distance ; and besides impeding the ploughing of the ground, extract a great share of the nourishment that would otherwise go to support the crop of corn. The additional expence in gathering and carrying home a crop of fruit from an extensive fruit-ground, beyond what is incurred, when four trees stand on the same space of ground, which, in the other case, is occupied by one, also merits attention.

Inconveniences, as great and numerous, result from having fruit-trees thinly scattered over a pasture-field. The grass, under shadow of the trees, is very inferior to that in the open part of the field. The cattle must be excluded, when the fruit begins to ripen, especially during and immediately after high winds, otherwise they would eat the fruit. The falling of the leaves in autumn is very destructive to pastures of all descriptions ; and the same additional expence and trouble of gathering and carrying home the crop, is also incurred.

For these reasons, a close-planted orchard must be preferable to orchard-fields : and where the soil and situation are proper ; the grounds stocked with full-bearing trees of the best sorts ; and when the trees, the fruit, and the liquor, are judiciously managed ; it is impossible, but, according to the produce and prices above stated, such orchards must turn out profitable, even supposing

posing they produce but one crop, equal to that above mentioned, every third year. On the other hand, if the slovenly manner of conducting the various operations of cyder-making be persisted in, it would be in favour of the nation, and of the individuals concerned in that branch of husbandry, that there were not a cyder-orchard in the island. Perhaps, on another account, also, it might be for the interest of the farmers in the fruit districts, that orchards were abolished. The quantity of cyder annually used by the servants and labourers, is so immense, that, considering the injury which the crops of grain and grass sustain from the lands being encumbered with trees, the labour of collecting and carting home the fruit, and the trouble attending the manufacturing it into liquors; this beverage must be a more serious article of expence than the generality of cyder-farmers are disposed to allow.

## CHAPTER XX.

*On Fallowing, and some Observations on Dibbling Wheat and Beans; and on Drill-Husbandry.*

**H**AVING, in some of the preceding Chapters, described, at considerable length, the usual methods adopted for the cultivation and management of the various crops, it may be proper, in concluding the subject, to take notice of a few practices, which, although generally adopted in particular districts, are in others little attended to. Some of these, especially dibbling, or setting wheat and beans by the hand, being subjects, rather curious, than such as are likely to become interesting to the British farmers at large, shall, on that account, be stated as shortly as possible.

## Section I. On Fallowing.

## II. On Dibbling Wheat and Beans.

## III. Some Observations on Drill-husbandry.



## SECTION I.

*On Fallowing.*

THE practice of fallowing, or of ploughing land repeatedly, during autumn, spring, and summer, with a view of extirpating weeds, and of preparing the soil for yielding more abundant crops, is very ancient.

It was unquestionably introduced into this island, soon after the Romans gained an establishment in it. From the astonishingly great and arduous undertakings, in which it is well known that people engaged, in order to improve the country, may be inferred the attention bestowed by them to introduce the best modes of husbandry then known. As fallowing was a practice generally adopted in the country whence that people emigrated, it would naturally be considered by them as one sure mean of preparing the British soil for the production of grain.

That the Romans devoted much of their attention, while in this country, to the cultivation of the lands, and that agriculture greatly flourished during their residence, we have the most incontestable evidence, in the large quantities

ties of grain they were able occasionally to export to the Continent. But it is not necessary to have recourse to the history of ancient times, for probable reasons, to support the opinion, that the practice of fallowing was introduced into Britain by the Romans. Almost every person knows, that the modes of cropping in the open-field parishes in England, which have remained for many centuries invariably the same, and which include fallow every third or fourth year, are exactly similar to those which were adopted by the Romans, and from which there has been less deviation in these parishes, owing to particular regulations that were early established, than in any other part of Europe.

One great purpose of fallowing is to destroy the weeds, which, in consequence of previous mismanagement, and of over-cropping, have increased to such a degree as to render cultivation for grain no longer profitable. Land, being allowed to rest for a season from yielding a crop, and being repeatedly ploughed, the soil exposed to the influence of the different seasons, and at the same time completely pulverized, its fertility is again somewhat restored, so that, by the application of a smaller portion of manure than would be otherwise necessary, it is rendered fit for again producing valuable crops of grain or grass.

It

It is universally acknowledged, that all soils, even those naturally the most fertile, are capable of being rendered unproductive by constant and severe cropping, and that the more improper the modes of cropping are, the sooner, and the more certainly, will a comparative barrenness ensue. Hence the propriety of fallowing, where imperfect modes of culture are adopted. Fallowing in what may be called the infancy of improvements in agriculture, is also essentially necessary. If land be greatly exhausted, no matter by what sort of previous mismanagement, fallowing is the most expeditious, the most effectual, and, every thing considered, the least expensive, method that can be adopted, for restoring its fertility, and rendering it productive.

It is the most expeditious; because it is completely done in the course of one season; whereas several years of culture, and a great additional quantity of manure, would be requisite, were any other less effectual mode of tillage adopted.

It is the most effectual; because the farmer has it in his power to destroy every weed, to turn over and expose the soil to the influence of the weather in the different seasons, and also to level and straight the ridges, drain the land, and remove every obstruction to the introduction of better modes of husbandry, none of which could be so conveniently or effectually performed by

any other mode of tillage.



between the harvest of one year and the seed-time of the next.

Fallowing is also, upon the whole, the least expensive method by which the fertility of land, greatly exhausted, can be restored; and the only one that can be adopted with a certainty of success, for the removal of every obstacle to the introduction of more perfect agriculture. Manure, operates more powerfully when applied to a field that has been properly summer-fallowed, than when laid on one that has been long under an improper course of cropping. The returns, after fallowing, will be to a certainty greater, and, therefore, although the actual expense of fallowing is considerable, yet the crop that succeeds is so much greater as to counterbalance that expense, while those that follow, if properly adapted to the soil, will yield the farmer a proper compensation for his extra trouble and expense.

In the above statement, the writer had chiefly in his eye the practice of fallowing, as recently adopted in the southern parts of Scotland; and the principles on which the farmers regulated their conduct, when new and better modes of husbandry became general.

Some writers on husbandry have recommended fallowing in every situation, and in the strongest manner, while others have reprobated the practice in terms as pointed; but without informing the reader of the circumstances under which

which these different opinions were formed, so that he might be enabled to draw the proper inferences.

The practice of fallowing may no doubt be adopted with propriety in some cases, while a slavish adherence to it in every instance would be highly improper. The following statement respecting fallowing will, the writer presumes, be acknowledged, not only as well founded, but as applicable to the present state of husbandry in the different parts of Great Britain.

1<sup>st</sup>, Where improvements in agriculture have never been introduced, or generally established, fallowing, as a mean of renewing the fertility of worn-out lands, is little known, and seldom practised.

2<sup>dly</sup>, Where a spirit for agricultural improvement prevails, and where the great body of the farmers evince a disposition to adopt new and better modes of husbandry, the practice of fallowing always becomes general.

3<sup>dly</sup>, Where fallowing every third or fourth year is a common practice, and has been continued for ages, while, at the same time, the soil and situation are favourable for the cultivation of green crops,—there agriculture will be found to be in a languishing state, and that the interference of the Legislature is necessary, either to unloose the shackles in which it is bound, or to create a spirit of exertion and enterprise among the inhabitants.

4<sup>thly</sup>,

tween the harvest of one year and the feed-time of the next. Following is also, upon the whole, the least expensive method by which the fertility of land, greatly exhausted, can be restored, and the only one that can be adopted with a certainty of success, for the removal of every obstacle to the introduction of more perfect agriculture. Manure, operates more powerfully when applied to a field that has been properly summer-fallowed, than when laid on one that has been long under an improper course of cropping. The returns, after fallowing, will be to a certainty greater, and, therefore, although the actual expence of fallowing is considerable, yet the crop that succeeds is so much greater as to counterbalance that expence, while those that follow, if properly adapted to the soil, will yield the farmer a proper compensation for his extra trouble and expence.

In the above statement, the writer had chiefly in his eye the practice of fallowing, as recently adopted in the southern parts of Scotland; and the principles on which the farmers regulated their conduct, when new and better modes of husbandry became general.

Some writers on husbandry have recommended fallowing in every situation, and in the strongest manner, while others have reprobated the practice in terms as pointed; but without informing the reader of the circumstances under which



which these different opinions were formed, so that he might be enabled to draw the proper inferences.

The practice of fallowing may no doubt be adopted with propriety in some cases, while a slavish adherence to it in every instance would be highly improper. The following statement respecting fallowing will, the writer presumes, be acknowledged, not only as well founded, but as applicable to the present state of husbandry in the different parts of Great Britain.

1<sup>st</sup>, Where improvements in agriculture have never been introduced, or generally established, fallowing, as a mean of renewing the fertility of worn-out lands, is little known, and seldom practised.

2<sup>dly</sup>, Where a spirit for agricultural improvement prevails, and where the great body of the farmers evince a disposition to adopt new and better modes of husbandry, the practice of fallowing always becomes general.

3<sup>dly</sup>, Where fallowing every third or fourth year is a common practice, and has been continued for ages, while, at the same time, the soil and situation are favourable for the cultivation of green crops,—there agriculture will be found to be in a languishing state, and that the interference of the Legislature is necessary, either to unloose the shackles in which it is bound, or to create a spirit of exertion and enterprise among the inhabitants.

4<sup>thly</sup>,

ably, Where it has become common to explode fallowing, although formerly a practice generally adopted in a district, and to substitute green crops in its stead,—there it will be found, that the art of agriculture has advanced considerably on the road towards perfection.

From these positions, it may be concluded, that where no particular restrictions impede the course, the use or disuse of fallowing, marks the commencement, and the progress, of improvements in agriculture. Great Britain furnishes evidence sufficient to establish the correctness of this statement. Let us examine the present state of husbandry in different districts of these kingdoms by this criterion, and the result will satisfy every person, that it is less liable to error than any other that can be adopted.

In the north and north-west parts of Scotland, and in some districts in Wales, the practice of fallowing land can scarcely be said to be introduced, at least it is only followed by a few individuals.—There, of course, the ancient system of one white-corn crop succeeding another remains completely established, and the returns are both trifling, and of the most inferior quality; in so much that, in ordinary years, the inhabitants are obliged to have recourse to importation, for the necessary supply of food. How long the farmers

farmers of these districts may neglect the introduction of fallowing, which may be denominated the mean by which the door to agricultural improvements would be most effectually laid open, is extremely uncertain. The poverty and ignorance, and in too many cases the slavish situation of the tenantry, added to the careless indifference which the proprietors in general evince, in regard to their own real interests, the situation of their people, or the improvement of their native country,—are obstacles so difficult to remove, that it is much to be feared, the period is yet distant, when this first advance towards improvement will be generally made: But, till that be the case, the agriculture of these districts must continue in a despicable state.

The spirit for improvements in agriculture, which has spread with such rapidity among the proprietors and farmers in the southern parts of Scotland, became first discernible in the general introduction of the practice of fallowing. Considering the worn-out and exhausted state of the lands, and the inequality and irregularity in the size and shape of the ridges, which was everywhere conspicuous when this disposition for improvement evinced itself, no means could possibly have been adopted, which would have insured so speedily the attainment of the object in view, as fallowing. In the course of performing that operation, the surface of the fields was



made as level as possible, the large stones removed, water-courses formed in the best directions, for carrying off the superfluous water, and every other necessary measure adopted, whereby new and better modes of culture and of cropping might be introduced with the greatest advantage. The success has been much more than equal to the labour and expence consequent on such undertakings, and demonstrates, in the clearest manner, that the principles on which the proprietors and farmers in that part of Scotland acted, were fundamentally right, and that they are such as, if adopted, and acted upon in any other country, where improved modes of cultivation are unknown, will necessarily produce the same beneficial effects, namely, general and permanent improvement.

A complete alteration having been, generally speaking, effected in the husbandry of that part of Scotland under review, by the means above mentioned, many proprietors seem now disposed to attain to still greater perfection in the management of their estates, by excluding fallow, or at least by what is nearly the same thing, *viz.* permitting their tenants occasionally to sow pease, beans, turnips, &c. in that portion of the farm, which, by the general established order of cropping, should be in fallow. This is however a degree of perfection in arranging the order of cropping, that is by no means general; on the contrary,

contrary, the practice of fallowing, at stated intervals, is too rigidly adhered to on a great number of the most valuable farms in Scotland, whereby an unnecessary expence is incurred, without any substantial benefit being derived. It seems an absurd rule, that to render a farm to the greatest degree productive, it is necessary that one-fifth or one-sixth of it should be annually cut off from producing any return.

Whoever has visited a few of the open-field parishes in England, will readily admit, that there agriculture stands much in need of reform. In these parishes, fallowing every third or fourth year, is a practice almost universally adopted, and has been generally established for ages. It is not however, from a conviction of the correctness of this method of preparing the soil for producing abundant crops, that it is still pursued: The sensible and intelligent farmers, many of whom possess lands in these parishes, are fully convinced, that to supersede the necessity of repeated fallowings, by the introduction of horse or horse and hand hoed green crops, would be the most essential improvement that could be adopted. But the dispersed situation of the lands occupied by every farmer, and the absurd regulations, some of them established perhaps a thousand years ago, by which the conduct of the community at large, as well as of every individual, must be regulated, renders the introduction

tion of better modes of husbandry, if not impossible, at least extremely difficult. The man of activity and enterprize, is placed on a footing with the most indolent; and must remain so situated, till, by the intervention of the Legislature, he is enabled to act more agreeably to the impulse of his own mind.

Whether the Board of Agriculture will ultimately prove successful in procuring a general inclosure bill, by which means only this great proportion of the best lands in England can be brought under proper cultivation, the writer pretends not to determine. From his knowledge of the importance of the object, and the advantages that would result from all the arable open-field lands in that kingdom being inclosed, he most sincerely wishes success to attend the measure. He is not, at the same time, very sanguine in his expectations: Numerous obstacles, he knows, and many of them of great magnitude, must be surmounted; and it may be found a task extremely arduous, to reconcile all the jarring interests that oppose themselves to the completion of a measure so complicated in its nature. If the perfection of agriculture consists in substituting, with advantage, green crops in place of fallow, as it certainly does, Norfolk is the district in Great Britain where that practice has become most general; and where, from many years experience, that mode of management



ment has been found favourable for the soil, and profitable to the farmer. The soil of Norfolk is in general indifferent; much of it light and sandy in the extreme, yet it is everywhere in a high state of cultivation; and the superabundant produce more considerable than what is exported from any other district, equal in size and population.

By substituting turnips, or other green crops, in place of fallow, the Norfolk farmers have one obvious advantage over those who adhere to the latter system; namely, that of a large annual addition of valuable manure. This, together with the modes of cropping being extremely favourable, two white-corn crops never succeeding each other, accounts in a very satisfactory manner for the lands being in a proper state of culture; and also for their producing, on an average of years, greater returns than those of better quality in other parts of Great Britain, although fallowed every third, fourth, or fifth year. Upon the whole, it appears evident, for the reasons already mentioned, that when it is proposed to adopt new and better modes of husbandry on a farm, that had been for a long time mismanaged, the most certain method to be adopted, for rendering it most speedily, and to the greatest degree, productive, is, to begin with summer fallow. By this means, the farmer will have it in his power, in ordinary seasons, to effect

fect all the objects which, in such a case, naturally present themselves to his view; but should any unforeseen circumstance prevent him from doing so, he will study his own interest, by again repeating the fallow in the ordinary course, till he can bring his farm into that state of culture, which he knows will ultimately turn out most profitable: Thereafter, proper attention in regard to cropping, a judicious choice of green crops, and general management, will preclude the necessity of his having again recourse to fallow, except on extraordinary occasions. On the occasional failure of a crop, weeds generally grow with more than ordinary luxuriance. As these are the greatest enemies to the farmer's prosperity, they should be extirpated at all events; and an adherence to any general rule, however correct in principle, should never induce him to allow them any quarter. If weeds have become so abundant, as to leave little chance of being able to destroy them by the ordinary methods of horse and hand hoeing, recourse should be had to fallow, as the speediest and most effectual method of curing the evil.

The usual method of fallowing land was described, when treating of the culture of wheat. It may not be improper here to add some remarks made by a gentleman-farmer in Dorsetshire, respecting fallowing\*. They are new and important,

\* Bath Society Papers, Vol. ii. page 270, &c.

important, and therefore merit attention; and seem equally applicable, whether it be proposed to winter fallow for barley, or to winter and summer fallow, as a preparation for wheat.

When the land is ploughed after harvest, which he recommends to be done as deep as possible, he says no time should be lost in rendering this new turned up soil as fine as harrowing can make it. He then adds, " I am convinced, " by repeated experiments, close observation, " and plain reasoning on known facts, that lands " that are made fine before the sharp frost " and winter rains come on, will receive a " much larger share of their influence than " any other.

" If the land be left in a rough state, there is " seldom time for the rains and frost to affect " more than the outside of the large clods or " lumps: The outside will indeed be pulverized, " but the *middle* of the lumps, wherever they are " large, will be found nearly in the same hard " stiff state, as when turned up by the plough. " Hence it must appear to every one, that the " benefit of air, winter rains, and frosts, on " lands thus left, is partial; and the consequence is, that harrowing it in the spring, " when these are over, is too late for its receiving the benefit which would have accrued " from



“ from them, and the power of vegetation is not  
“ so vigorous.

“ But to make winter fallows as fine as they  
“ can be in autumn, and then ridge them up in  
“ that pulverized state, is acting most agreeably  
“ to nature. The greatest possible quantity of  
“ surface, is by this means exposed to the atmo-  
“ sphere; and the land is left in a state, where-  
“ in the rains and the frosts are most easily ad-  
“ missible. They will then penetrate and enrich  
“ the whole mass to a greater degree.

“ If the frost penetrates a quantity of earth,  
“ formed into a large hard clod, *partially*, on  
“ account of its bulk and hardness, (which is al-  
“ ways found to be the case), it is evident, that  
“ the same clod, broken into four parts, would  
“ be thereby penetrated four times as much;  
“ or, in other words, four times the quantity of  
“ earth would be affected by it, and on a thaw  
“ be pulverized. For we find, that after the  
“ breaking up of a severe frost, all the small  
“ clods crumble easily into powder; while the  
“ large ones are only made smaller, by the  
“ crumbling off of their surfaces to a certain  
“ depth.”

Such are the reasons which this gentleman  
assigns for differing in the mode of managing  
his fallows, from the generally established prac-  
tice. They ought to have considerable weight  
with

with those particularly, who cultivate soils of a strong and adhesive nature ; as the success which attended the experiment he made, is a sufficient inducement to others to follow his example. He mentions, that he left one half of a field of ten acres, as nearly of an equal quality as possible, in the rough state after ploughing ; and that he made the other very fine, by harrowing, and by beating in pieces any large hard clods, which the harrows would not break.

In the following spring, that part which had been harrowed was much finer, without any additional labour, than he could render the other by repeated harrowings. This he accounts for, by stating, that the rain and frost not having penetrated the middle of the large clods, they had received no benefit therefrom ; and were as hard as bricks, being only lessened in size.

The whole field was sown with barley, and nine pounds of broad clover immediately afterwards. On harvesting the crop, he kept that of the one half of the field separate from the other. The part which had not been harrowed in autumn, produced twenty-four bushels the acre ; the other thirty-one, and the quality of the grain much superior. The crop of clover the following year, was equally in favour of this new method of fallowing ; being heavier, by

near half a ton the acre!—How much is it to be regretted, that proprietors and farmers do not more frequently make experiments, and record the result! It would be a fund of satisfaction to themselves, and would tend ultimately to promote the public good.

If, from repeated experiments, it shall be found, that the trifling difference of harrowing a field in autumn in place of spring, produces uniformly such additional returns as are above stated, it is a strong evidence of how many useful, yet simple discoveries, remain to be made, in regard to the proper modes of conducting the operations of husbandry.

S E C.



*On Dibbling Wheat, Beans, &c.*

THE practice of dibbling, or setting wheat by the hand, was first introduced into Norfolk about twenty years ago, by a person who possessed a small farm in the neighbourhood of Norwich. This practice, which gradually gained ground in that district, has now become pretty general in the adjoining counties of Cambridge and Suffolk. In both of these, as well as in the county of Norfolk, considerable quantities of wheat are annually set by hand; but in Norfolk, where this method was first adopted, the quantity of wheat now planted by hand is not nearly so considerable as it was a few years ago.

Wheat is generally dibbled in October, on land newly broken up from clover ley. When the soil is of a light nature, it is usually rolled before the seed be planted; the method of doing which is as follows. A man, with an iron dibble, of about three feet long in each hand, walking backward, makes two rows of holes in each furrow, flice, or flag; these are made about four inches distant from each other, and from one to two inches deep. The dibbler is followed by

two or three women, boys, or girls, who drop two or three grains into each hole. The field is afterwards bush-harrowed, by fixing thorns to a gate, and drawing it by one horse along the furrows. The usual quantity of seed is about six or seven pecks, and the expence of setting from nine to ten shillings the acre. An experienced dibbler, with three active attendants, will plant half an acre a day, making six holes in every foot length along the furrow.

The advocates for dibbling wheat state several advantages which, in their opinion, result from adopting this method in preference of the ordinary one of sowing broad-cast. They say a considerable quantity of seed is saved: That the grain is better, more equal in quality, and the increase greater; and further, that by the general establishment of this practice, the poor would find employment.

There is no doubt but a considerable saving must take place in the article of seed, when the grains are dropt at regular distances, in place of being scattered promiscuously. The quantity is said to be in general about a bushel the acre. Were no other benefit derived from adopting this practice, than saving a bushel of seed on the acre, that, at the ordinary price of wheat, is more than counterbalanced by the extra expence incurred. The farmer, in order to save this bushel of wheat, value five or six shillings, must

must pay his labourers nine or ten. On this principle, therefore, the practice cannot be defended.

It is natural to suppose, and will be readily admitted, that a crop of planted wheat will always be to a certain degree better and more equal in quality; and (although, from that circumstance, probably chiefly) greater in quantity than that sown broadcast. The crop, springing up at regular distances, enjoys, during the whole period of its growth, a more free circulation of air, and derives greater benefit from the rays of the sun, than when, by sowing the seed too thick, or irregularly, the plants stand so close together, that both are in a great measure excluded. There is another reason why the grain should be of a better quality. It was observed, that wheat is commonly dibbled on land broken up from one year's clover.

When wheat is sown broadcast on such lands, a great many of the seeds falls naturally into the interstices of the furrows, where they are either choked, or retarded in their growth, by the weeds which spring up there in greater abundance than in the other parts of the field. Whereas, when the seeds are set in the flue or flag, the plants cannot interfere with any impediment to retard their growth. Although, for these reasons, it is highly probable, that the produce of dibbled wheat must always be superior  
in



in quality and quantity to that sown broadcast; yet, without repeated experiments, or the establishment of a law, whereby all grain shall be sold by weight, it is impossible to determine the extent of that superiority; or, whether so much advantage results therefrom, as to encourage farmers, in other parts of these kingdoms, if practicable, to adopt the same method.

Some people have gone so far, as to assert, that dibbling wheat is one of the greatest improvements in modern agriculture; and that owing chiefly to the circumstance of its furnishing work for the poor. In a populous district, where agriculture is almost the only employment of the inhabitants; and where the poor-rates have advanced to an extravagant height, the introduction of any new practice, whereby the poor can be usefully employed, while the individuals, who furnish that employment, if they are not benefited, are not injured thereby, must be deemed a very essential improvement. Dibbling wheat, therefore, in districts so situated, especially if followed out by hand-hoeing, so as to afford still longer work, may be a very proper way of furnishing employment for the peasantry. But in a country like Great Britain, where the great body of the people are alternately employed in warfare, or in commerce and manufactures, and the ordinary operations of husbandry, the impracticability of rendering this a general practice,

tice, must be at once obvious. The population must indeed be amazingly increased before that can happen.

Populous as this island now is beyond what it was at any former period ; yet, were a law enacted, that all grain should be planted by hand, it would be necessary, that all ranks, the governors, as well as the governed, should learn how to use the dibble. In a word, although the practice may be beneficial, as well as laudable, in some particular districts, yet no person, in his sober senses, will think of recommending the general establishment of it as an improvement in the national agriculture.

The practice of dibbling pease and beans, which is sometimes done separately, and sometimes mixed together, is chiefly confined to Gloucestershire, and the operation for the most part performed by women. As soon as the land can be got properly harrowed, and the surface smoothed, in the spring, that is, between the beginning and middle of February, the work of setting commences : In some places, in rows across ; but more frequently along the ridges. Some setters use a line to direct them, in forming the rows at equal distances ; others again, particularly those who have been long used to the business, do not consider a line as necessary. The setters begin each at the end of a row ; and making holes at the distance of about two inches from

from each other, and about the same depth, deposit one pea or bean in every hole; and thus proceed, till the work be completed. The distance between the rows is seldom less than ten; and, in few instances, more than fourteen inches. The quantity of seed necessary is from two and a half to three bushels, according to the distance of the rows; and the price of setting from 3 s. 6 d. to 4 s. 6 d. the acre. When the setting of the field is completed, it is gently harrowed, in order to cover the seed, and the crop is repeatedly hand-hoed afterwards, as occasion requires.

If the object which the Gloucestershire farmers have in view in adopting this practice, be to furnish employment for the poor, the crops being always repeatedly hand-hoed by the persons who were employed in putting the seed in the ground, is a strong additional circumstance in support of the justness of the principles on which it was adopted, and of which those who are in the habit of setting wheat, cannot avail themselves. If an extraordinary number of people be not employed, these repeated hoeings must take up a considerable period; and will not, in ordinary cases, be finished before the commencement of hay-harvest; which being again succeeded by the corn-harvest, the industrious poor are thus furnished with almost uninterrupted employment in the fields for six or seven



seven months. In districts, where the poor, from long habits of idleness, have become numerous, profligate and useless, members of society, this must be considered in every point of view advantageous: While, under other circumstances, this method of managing bean-crops might be impracticable, from the rate of wages, and the people being fully employed in manufactures; or, if practicable, neither beneficial to the community nor to individuals.

Where these circumstances occur, and they fortunately do so over the greatest part of this island where improved agriculture is practised, drilling beans, or dropping them in the bottom of every second or third furrow, and afterwards horse-hoeing the crop, will be found a method not less favourable for the soil; and, if at all, but in a small degree, less profitable to the farmer.

## SECTION III.

*Some Observations on Drill and Horse-Hoeing Husbandry.*

THERE are few subjects connected with husbandry, that have attracted the attention both of theoretical and practical farmers more than this. Some have said too much in favour of drill-husbandry in general; while others, from probably the failure of some ill-constructed experiments, have exerted their endeavours to impress on the public mind, the absurdity of adhering to a system which they have had so much reason to reject.

Drill-husbandry may be defined, the sowing of grain and other seeds with a machine, and in regular rows, in place of scattering them promiscuously by the hand, by which means they are dropped at more equal distances, and lodged at more proper depths, than can be done in the ordinary way. Horse-hoeing husbandry, which is intimately connected with the former; and which for the most part forms part of the same system, is nothing more than repeatedly ploughing the interstices, while the crop is growing in the rows. The horse-hoeing of crops is a practice that has

been long established in Italy, and had its rise not in any intention to improve, but to destroy the crop. The circumstance is related by Pliny, who informs us, that a people whom he calls the *Salassi*, ravaged a country adjoining to the Alps. This depredation having been committed after the crops were sown, these the invaders were anxious to destroy; and to effectuate their purpose, they ploughed in the growing corns. This operation, it would appear was, as might naturally be expected, performed in a hurry, and of course imperfectly, in so much, that the plants which remained, owing to this additional culture, became more than ordinarily luxuriant, and thereby the natives were induced to continue the same method of culture\*.

Drill and horse-hoeing husbandry were first introduced into England by Jethro Tull, Esq; of Sharbone, in the county of Berks, about the year

\* The above is not the only instance where ravages and wars, have tended ultimately to the improvement of a country. The Roman invasion was the means of introducing agriculture into Britain. The Norman conquest operated greatly towards its improvement. By Oliver Cromwell's over-running Scotland, white oats were first brought into that country. The close of the rebellion of 1745, is the æra whence to date the commencement of agricultural improvements on the north side of the Tweed. Besides these, other instances recorded in the history of these kingdoms might be mentioned.



year 1713, and are now well known by the name of Tull's husbandry.

The saving of seed, (for it will be universally admitted, that a quantity unnecessarily great is often sown), is no doubt an object that merits attention, and to effectuate which, drill machines are well calculated. That weeds should be destroyed, and the soil pulverized and exposed to the influence of the sun and air, must also be agreeable to the ideas of every good farmer. But although the principles of this new system of husbandry may be correct, and such as carry conviction along with them, yet some of the methods of practice may not so readily meet general approbation.

Drill husbandry may not improperly be ranged under the following heads:

I. Drilling wheat, barley or other white-corn crops, in distinct rows, at from three to five feet distance, with a view to horse-hoeing.

II. Drilling in rows of eight or ten inches distance, with intention to hand-hoeing.

III. Drilling in rows, of the same distance as last above mentioned, but only for the purpose of saving seed.

IV. Drilling

IV. Drilling and horse-hoeing green crops, and thereby excluding the necessity of repeated fallowings.

*First*, Drilling wheat, barley, or other white-corn crops, in distinct rows, from three to five feet asunder, and with a view to horse-hoeing, was the method first adopted by Mr Tull, and since followed by an individual or two in a few particular districts. If after upwards of eighty years practice of this method of culture, so few converts have been made, at least who adhered to it for any considerable time\*, the presumption is, that there is something fundamentally wrong either in principle or practice. If the principle be admitted to be right, which it certainly is, then the error must be in the practice.

It seems only necessary to mention the distance at which Mr Tull, and his disciples, conceived it necessary to drill the rows of wheat, without mentioning the additional circumstance, that dung was seldom or never applied, to convince every

\* The only instance where the writer has had occasion to see wheat drilled for a course of years, at such distance in the rows as above mentioned, was by Dr Walker near Elgin, in the county of Moray. If that gentleman has not derived much emolument from pursuing this method of culture, he may at least enjoy the satisfaction of reflecting, that he has afforded much amusement to the *old-fashioned* farmers in the neighbourhood.

every intelligent person of the absurdity of adopting this method,

It is by no means intended to enter on a hypothetical statement of the comparative expence, or the superior advantages resulting from an adherence to this which is called the new, or to the other which is called the old husbandry. Numbers of these have long since been laid before the public, but with little success in regard to the more general introduction of the new system, if we may judge from the small number of converts that have been made. These are, indeed, very inconsiderable, for it is probable there are not half a dozen real Tullians in the island. Scotland, the writer has reason to believe, can only boast of one. Perhaps in place of entering at great length into the merits of this long disputed question, which of the two systems is the best, it may be equally proper to put the matter in a new point of view, and allow the reader to draw his own conclusions. Suppose an agricultural writer were to come forward, and state to the British farmers, That if they would fallow their lands for four years successively, and sow it with wheat the fifth, they would have as valuable a return in that year, as others would reap, who sowed turnips, barley, clover, wheat in succession; or who adopted any other judicious rotation, by which the land would be fully occupied for the whole period.

Unfortunately



Unfortunately for British agriculture, Mr Tull placed too much faith in good culture, or more properly disregarded the benefits which every farmer of the weakest understanding knows are derived from the use of manure. Had that not been the case, the practice of horse-hoeing green crops, a practice which is now very generally adopted in many counties, and with never-failing success, would have been introduced at a much earlier period, and the national husbandry would ere now have arrived at a much greater degree of perfection.

*Secondly*, The drilling of white-corn crops in rows of eight or ten inches distance, with intention to hand-hoe, is a method practised by Mr Ducat of Esher, in the county of Surry, (whom Mr Young styles the "Prince of Farmers,)" on a larger scale than probably by any person in Great Britain. The arguments mentioned in the former section in favour of dibbling, are equally applicable here. There is a saving of seed. The grains are deposited at the most proper depths, and numbers of poor people find employment. To these may be added, what cannot have escaped the observation of every farmer, who, like the writer, has surveyed Mr Ducat's fields, that they are in a high state of culture, and the crops free from weeds. On the other hand, the extra expence to which Mr Ducat is necessarily subjected in the management of his farm, must be considerable:

able : Perhaps greater than any, or all the advantages that can possibly result from an adherence to this practice. But, as was formerly hinted, any generally established mode of culture by which a great additional number of hands would be requisite, cannot possibly be adopted in these kingdoms, while manufactures continue to increase. Mr Ducat, however, as an individual, deserves praise ; his labours in the agricultural line are not in vain, for every person who perambulates his farm, will return satisfied of two facts, namely, “ that good culture, and attention to keeping the crops clean,” are essentially necessary to the production of valuable crops.

*Thirdly*, Drilling in rows, of the same distance from each other as last above mentioned, but only for the purpose of saving seed, can only be attended with one other advantage beyond sowing broad-cast ; that is, the certainty of depositing the seed at the most proper depth. Another, indeed, occurs, and is a necessary consequence of adopting this practice. The land must be in a better state of tilth, to allow the drill-machine to work steadily, than what is always deemed necessary when a field is sown broad-cast.

This method of depositing the seed, is common in several of the English counties ; but, whether the saving of the seed, and the superiority

ority of the crops, in consequence of the additional cultivation, are sufficient, or more than sufficient, to counterbalance the extra charge for ploughing, harrowing, and drilling, the writer has not had sufficient opportunities of procuring information, so as to enable him to draw accurate conclusions.

By much the greatest quantity of grain sown with drill-machines in England \*, is sown with a view to horse-hoeing. The drill (Cook's for instance) which sows six or eight rows at a time, can with the greatest ease be converted into a hoe, or rather into as many hoes as there are interstices between the rows that are sown at one time. By this means, the lands may be cultivated at a trifling expence, while the crop is growing, which cannot be done in the broadcast husbandry, unless in the manner practised in Gloucestershire, that is, by hand-hoeing. Several of these machines sow or hoe, seven or eight rows at once; so that one or other of the operations may be performed over eight or ten acres in the course of a day. It must be agreeable to the sentiments of every person in the least degree acquainted with the subject, that to break the crust that forms, especially on soils of a

VOL. III.

N

tenacious

\* Drill-machines are never used in Scotland, the instance above-mentioned only excepted, unless for sowing beans, or turnip-seed.



tenacious nature during winter, must give great relief to the young tender plants of wheat in the spring; and on that account, hoeing must be advantageous; but it is worthy of remark, that hoeing a crop of wheat in the spring, may tend materially to accelerate or retard its growth, according to the state of the crop at the particular period when the hoeing is performed. If the hoeing be performed when the crop begins to tiller, it will encourage its doing so to a greater degree, than if the soil had not been moved, and consequently retard the growth of the plants. Whereas, if the hoeing be delayed till the tillering is over, it gives new vigour to the plants, at a season of the year, when, without such a stimulus, they would spring up only by slow degrees. This is a remark, which those who adopt this method of cultivating wheat, will probably find worthy of attention. In regard to spring-corn, the only use of hoeing can be to destroy weeds. That being the case, the writer begs leave to surmise, that when lands are cultivated in a proper manner for receiving the seed, this additional culture must be in a great measure, if not altogether, unnecessary. On the whole, although the hoeing of wheat, when performed at the proper period, must, for the reason above mentioned, be advantageous; yet it does not appear so evident, that the hoeing of oats or barley, or even wheat, when sown late

in

in the spring, and when the land is in such tilth as a good farmer would approve of, is likely to be attended with benefit to the crop, equal to the expence of the additional culture, trifling as it may be stated.

*Fourthly.*—The drilling and horse-hoeing of green-crops, and thereby preventing the necessity of summer fallowing, is not only an improvement on Mr Tull's system, formerly mentioned, but one of the greatest that has taken place in agriculture since the introduction of artificial grasses. It is extending the garden culture to the field, in a manner of all others the most likely to produce beneficial effects. These effects have indeed already appeared in a manner so conspicuous, as cannot have escaped the observation of ordinary observers, and renders any further commentary unnecessary. Where the practice of horse-hoeing green-crops has become common, fallow, except on extraordinary occasions, is never thought of, while a wonderful change for the better appears in the culture, and in the superiority of the crops on every farm. This truly admirable method of culture, is, however, confined chiefly to Scotland, and the north-east of England. But the advantages resulting from a steady adherence to it, require only to be known, to render it general in every part of the island.

Where

Where horse-hoeing husbandry is adopted for the culture of turnips, potatoes, beans, cabbages, &c. the land is ploughed in the ordinary manner three or four times, as occasion requires; and the seeds and plants being inserted at the depths, and in the manner mentioned when treating of the culture of these various crops, they are afterwards horse and hand-hoe'd repeatedly during the following season. The consequence of which is, abundant crops are produced, while the land, in place of being injured thereby, is put in probably the very best condition of which it is susceptible, for producing a valuable crop the following season. Who but those who have had access to know from the best authority, would believe, that while the farmers from Durham, along the eastern coast, almost to Inverness, have improved the country, by means of horse-hoe'd green crops, to a degree almost unknown in any part of the island; still, in several of the most favourably situated counties in England, many of the farmers consider, that all the culture requisite to be bestowed on a turnip crop is finished, when the seed is scattered and harrowed in? Yet this is literally the case. If ever the labours of the Board of Agriculture are to prove beneficial to the nation, the members, exerting every endeavour to diffuse a general knowledge of the practices of particular districts, is the surest mean.

Who



Who can suppose that the farmers in the counties of Bedford, Lancaster, &c. were they fully informed of the superior crops of turnips, which, by horse and hand-hoeing, are raised in Northumberland, Berwick, Angus, &c. would neglect for a single season so certain means of cleaning their fields, and augmenting the weight and value of their crops?

Although the writer has condemned, without reserve, the horse hoeing husbandry, as recommended and practised by Mr Tull; and although he has hesitated to determine as to the propriety of recommending some of the other methods above mentioned, he is nevertheless under no difficulty in giving it as his decided opinion, that the general introduction of the practice of horse-hoeing and hand-hoeing crops of turnips, potatoes, beans, and cabbages, in rows, at thirty inches or three feet distance, would be a more effectual mean of improving the culture, and increasing the quantity and value of the general produce of these kingdoms, than any other that has hitherto been suggested, or that can possibly be adopted\*.

Many

\* Those who are anxious to acquire more minute information respecting drill husbandry, the writer begs leave to refer to Tull's Horse-Hoeing Husbandry, folio edition.—Baker's Experiments in Agriculture.—Du Hamel's Culture des Terres.—Young's Tours;—and, Wight's Husbandry.

Many are the improvements that have taken place in the construction of drill-machines since the days of Mr Tull. The one for which Mr Cook received a patent, is probably as complete as any at present in general use. It sows all kinds of grain and seeds, and seven or eight rows or drills at a time, inserting the grain at regular depths, and at equal distances.

The writer's friend, Mr Bailey, who favoured him with a description of a plough which he invented, a plate of which is given in the second volume, has been so obliging as to add to the former favour, by sending him an engraved figure and description of a drill upon a new construction, invented also by himself. As this drill is constructed on the principle of varying at pleasure ; and while the machine is at work, the quantity of seed to be sown, according to the soils, seasons, and other circumstances ; the following description, together with the annexed plate, of this machine, will, it is hoped, prove agreeable to those particularly who practise this system of husbandry on a large scale.

*A Description of a Drill, upon a new construction, for sowing all kinds of Grain, in any quantity, and at any distance\*.*

THE inside part of the drill, by which the quantity of seed is regulated, is represented by fig. I. where AX is an iron axle,  $1\frac{1}{4}$  inch square, upon which are fixed, at 8 inches distance, five brass-fluted cylinders, the flutes being rather more than a semi-circle,  $\frac{5}{8}$  of an inch in diameter, or  $\frac{5}{8}$  wide, and  $\frac{3}{8}$  deep.

RM are hollow cylindrical rims of hammered iron, which have segments turned down at right angles, to fit exactly the flutes of the brass cylinders; the cavities of which are increased or diminished, by the segments of the iron cylindrical rims sliding backwards or forwards in the flutes. This is performed in all the cylinders at the same time, by a rectangular space *n* being made in the brass cylinders, through which passes a straight piece of iron, IN, moving on friction wheels at I, and fastened to the plates at LK, and also to the cylindrical rims RM.

LV is a lever, the fulcrum of which is F, and moved by a screw S passing through the frame at

\* Invented by J. Bailey, Esq; from whose essay on ploughs this description is taken.—Mr Bailey's Essay on Ploughs is sold by Messrs Robinsons of London, price 2 s. 6 d.



at V. The end at LK is forked, and made to *fit exactly* the sides of the collar or plates of iron JK.

By turning the screw S, the lever moves the whole of the rims at once; and the cavities are increased or diminished at pleasure\*, and almost instantaneously, to sow *any kind of grain*, and *in any proportion*, which is shewn upon the scale EOP, by the index KO, fixed to the end of the lever at K.

The scale is graduated, to shew the number of grains of each species deposited in a foot.

HTW is a part of the back of the hopper, where UW represents the fixed part of the tongue, which collects the seed into the cavities, and by its oblique position, prevents them from bruising. TU is the moveable tongue, and is elevated or depressed by the screw T, to suit different kinds of grain.

Fig. II. is a view of the machine when ready for work. The seed being put into the hopper HO, is delivered by the cylinders (represented in Fig. I.) into the spouts SP, down which it slides to the coulter C; the distances of these are regulated by a square staple, passing

\* This is done with the greatest facility and readiness, even while the machine is going and at work; which is frequently necessary, where the land varies considerably in quality, upon different parts of the same ridge.

passing through the holes in the rail RL; by this means the distance of the rows can be varied at pleasure. And the arch of iron IK, by taking up or letting down, will regulate the depth at which the seed is to be deposited.

The spouts and coulters are hung upon a loop, and act independent of each other; and, by being allowed a little play in the rectangular staples, they pass through every accidental hollow in the land; by which means they never fail to deposit the seed properly in those hollows, which, when the coulters are fixed, is generally left upon the surface.

Any particular row is prevented from sowing, by putting in the flots or shutters T; and the whole are prevented from sowing, while turning at the end, by a small pinion N being detached from another, placed upon the nave of the wheel.

The figure in the upper corner of the plate, represents a section of a brass cylinder, of the *real size*. The square space in the middle, is for the iron axle; the rectangular one, *n*, for the iron slides IN; and the cavities *cde*, for the grain, are formed by describing the fore part *cd*, from the centre *a*, with a radius of  $\frac{5}{16}$  of an inch; and the back part *de*, from the centre *b*, with a radius of  $\frac{3}{8}$  of an inch. *ef* is the position and place of the tongue TU.

For turnips, the large hopper is taken off, and a set of small ones fixed upon the semi-oval cavities at the end of the brass cylinders. The quantity of seed is regulated by a tongue, which screws up or down at pleasure.

For sowing beans at wide intervals, *viz.* from 24 to 30 inches, Mr Bailey uses a drill with only one wheel and one cylinder, which a man wheels before him in the furrow, or (what he finds much better) may be fixed in the body of a small plough, drawn by a single horse; by this means, the wheel passes along a smooth surface, between the land-side and mould-board, and the seed is deposited at a regular depth: Two inches answers very well for beans. With the same small plough and drill, he has sown both wheat and barley, at six or seven inch intervals; and one and one-half or two inches deep, with good success; and, for small concerns, this cheap and simple apparatus, will probably be found the most eligible.



---

## CHAPTER XXI.

### *Live Stock :—as Horses, Cattle, Sheep, &c.*

**I**N the early ages of the world, herds of cattle, and flocks of sheep, constituted the riches of the inhabitants. This must ever be the case, not only in infant states, but in those also where the useful arts have made greatest progress. The riches of any people consist chiefly in grain, and in valuable breeds of live stock.—By these only can the actual prosperity of a nation be estimated.—Without these, manufactures cannot be established, commerce extended, nor population increased, nor supported. Peru is rich in gold and silver; but the corn-fields, and the horses, cattle, and sheep, of Great Britain, are treasures infinitely more valuable. Gold and silver, and paper-money, have no other value, than what they derive from the productions of the earth :—These are indispensably requisite for the subsistence of man, and in these alone centres real wealth.

Although

Although a desire to improve the culture of our fields, has evinced itself almost generally in the improvable part of this island, yet it is astonishing, in how few districts attention has been bestowed to improve the breeds of the different species of live-stock; or, at least, with what little success the exertions that have been made have hitherto been attended. Some individuals, indeed, in a few particular counties, possessing knowledge and perseverance, have advanced their own interest, and rendered an important service to the community, by devoting their attention chiefly to this object. Much, however, remains to be done. A wide field is still open to active and intelligent farmers, who, by combining improved breeds of stock with the proper cultivation of the soil, may raise British husbandry to the highest degree of perfection of which it is capable.

It is not possible, in the limits prescribed to this work, to enter so fully on the subject of live-stock, as its importance merits. It is a subject, on which many useful volumes might be written; and, at the present period, with peculiar advantage.

It is obvious that, in consequence of the improved cultivation of our fields, live-stock, superior in size and value, can be maintained with advantage on many farms, where puny and unprofitable breeds are now kept. The increase

of

of luxury, which is universally acknowledged, and the additional demand for butcher-meat consequent thereon, renders attention to improving the breeds of cattle, sheep, swine, &c. of more importance than at any former period; while the demand for horses, either for the coach, the faddle, the cart, or the plough, will always continue to increase, as long as luxury, manufactures, and agriculture, maintain a progressive motion. For these reasons, the circumstances necessary to be attended to in breeding, rearing, and managing live-stock, cannot be too fully explained; nor the knowledge of the best methods to be adopted in these respects, too generally diffused.

In the following sections, the various sorts of live-stock will be found classed according to their value.

## SEC.



## SECTION I.

*Horses.*

AT what period horses were brought into this island, or whence, or by whom, imported, is of very little consequence to have ascertained. This much, however, we know, that when Julius Cæsar invaded it, he was astonished not only to find horses in abundance, but these so well trained to war, as to alarm and shake the courage, even of the Roman legions.

It has already been observed, how attentive the Romans were to improve the countries which they conquered; and that they embarked in several very arduous undertakings, in order to lay a stable foundation for the improvement of Britain. Hence it may be inferred, that they would import horses from the continent, for the double purpose of recruiting their cavalry, and performing several of the operations connected with husbandry. After the Norman conquest, that great national object, "improving the breed of horses," seems to have been in a great measure neglected; inasmuch, that in the reign of Henry VIII. it became necessary to enact some severe statutes against allowing stallions

lions of two years old, in some places under fourteen, and in others, where the breeds were of a larger size, under fifteen hands high, to run in any forest, or common, where mares were pastured. These statutes empowered the magistrates of the bounds to survey the forests and commons, and to cause kill all such mares as they found therein, that had not the appearance of producing foals of a proper size. It was also enacted, about the same period, that a certain number of breeding mares, not under thirteen hands high, should be kept in every deer-park. These statutes, arbitrary as they may appear, in these days seem, from the state of degeneracy to which the breed of horses had at that time sunk, to have been in some degree excusable; for we are informed, that a few years afterwards, that is, during the reign of Queen Elizabeth, when the Spaniards threatened to invade England, there were not found in that extensive kingdom, after an accurate examination, more than three thousand horses, that could be used for the purposes of war: A number so contemptible, that, were not the fact well authenticated, it would hardly gain credit. The deficiency of horses for defence, which, on this memorable occasion became so evident, was probably the reason that first induced the people of rank and fortune to turn their attention to increasing and improving the breed. In process of time, stallions were  
imported

imported from foreign countries. The custom of giving plates, in order to create a competition among the breeders of swift running horses, was established \*, and other measures adopt-

\* The custom of giving King's plates was established on very laudable principles, namely, as a mean of creating a spirit of emulation among the farmers who at that period were in the habit of breeding horses. That it had the desired effect, is unquestionable; but that the continuing these premiums, is now attended with any good consequences, is very doubtful; while, on the other hand, it is certain, many bad effects result from the practice. In the *first* place, it has been so long continued, that the original intention, in place of being longer answered, is defeated; the horses, now deemed fit for the race-ground being of so slender a form, as to be incapable of answering any useful purpose. *Secondly*, The annual loss of labour which the nation sustains by the working part of the community attending at these places, is immense; and, *thirdly*, The numerous horse-races established in the various parts of these kingdoms, and which are every year increasing, in place of being schools at which the morals of the people are likely to be improved, are, as every intelligent person must have observed, seminaries for initiating the lower class of people into habits of idleness and debauchery. In a word, continuing to give King's plates and city purses is worse than the most extravagant waste of the public money. It is nothing else than Government holding out incitements to the inhabitants of Great Britain to become a nation of gamblers; a science, in which it is

but



ed to draw the attention of the farmers to this important object; and which was, by degrees, so completely effected, that English horses, whether for the course, the field, the road, the coach, or the purposes of husbandry, have been long considered, if not superior, at least equal to those of the other parts of Europe.

There are supposed to be only two distinct breeds of horses in Great Britain: The race or blood sort, and the cart or plough horse. Some have imagined the small ponies common on the mountains of Wales, and in the northern parts of Scotland, are a distinct breed from the others.

This, however, it is probable is not the case. The only perceptible difference between them and the ordinary cart-horse of England, and the south of Scotland, is in the size; and this may be accounted for in a very satisfactory manner, by observing, that these small horses are bred in cold, rainy, mountainous districts; that they are reared without attention; and that when broken into work, they are treated and fed with the greatest degree of carelessness.

The

but too true, they are making rapid progress; and in which, it is highly probable, they would soon arrive at a sufficient degree of proficiency, either for the public good, or the happiness of individuals, were the fostering hand of Government in this respect to be withdrawn.

The long established practice of importing stallions and mares from the Continent, and of crossing these with the ancient breed of the country, has been the means of producing as many varieties in the size as in the proportion and temper of the British horses. Some are adapted for running with great swiftness; others, for travelling, hunting, &c. others for war, and others for draught; of the last, or those which are chiefly employed in the operations of husbandry, it is only intended to take notice. The names by which the different breeds of farm horses in England are distinguished, are as follow, *viz.*

The Black Cart-Horse.

The Cleveland Bay.

The Suffolk Punch;

And,

The Small Welsh Ponies.

An account of the breeds of horses in each particular county in Great Britain has already been given. Before describing the best methods to be adopted for breeding, rearing, and managing horses with advantage, it may not be improper

proper to specify a few of the particulars in which each of the above breeds, or rather the varieties that have sprung from the two original breeds, differ from the others.

The black cart-horse is the common breed of some parts of the counties of Lincoln and York, and general in the counties of Leicester, Stafford, Derby, and Warwick. This breed is in size superior to any other in the kingdom. Naturally inactive, and slow in motion, clumsy, and frequently ill proportioned, infinitely better adapted for drawing ponderous loads on the London pavements, than for ploughing and harrowing, or for performing any of the other operations connected with husbandry. Respecting the breed of black cart-horses, Mr Marshall thus writes: "The breed of grey rats with which this island has of late years been over-run, is not a greater pest in it than the breed of black fen horses\*."

The largest of this breed are employed in London, and other cities, as dray-horses. The next size are employed in husbandry, and as coach-horses; and the smallest are bought up by Government, and trained for war.

The Cleveland bays are clean well-made animals; very strong and active; and are equally in

\* See Marshall's Rural Oeconomy of Yorkshire, Vol. ii. page 164.



in request for the coach, the saddle, and the plough. They are capable, both of great and long continued exertion. Great numbers are annually sold, when young, at the fairs in the district, or in the neighbourhood. The best are used as coach-horses; those of lighter bone for the saddle; and the remainder in the plough and cart.

The real Suffolk punch is a short plain looking horse, very compact, and more active and hardy than any other in the low parts of England. This breed has been much improved of late years. The Suffolk horses are, when compared with the others before mentioned, of a small size, not exceeding fifteen, or fifteen and a half hands high; but so active, that the farmers in that county and in Norfolk very commonly plough two acres a day in the busy seasons with a pair of these horses. They are chiefly employed in the operations of husbandry.

There are three breeds of horses in Wales, or more properly horses of three different sizes; as, the Welsh ponies, the larger breed of the country, and a cross breed between stallions from England, and the country mares. The first are very diminutive, and it may be added very useless animals, fit only for boys to ride upon, although sometimes employed in carrying coals, &c. in baskets, to the towns in the neighbourhood. The second, although remarkably hardy,

dy, are below the proper size that ought to be employed in draught; and being in general ill shaped, are comparatively of little value. The third may be described, as being stout, active, hardly well shaped, and easily reared. They are about fifteen hands high; and upon the whole, considering the state of agriculture in that country, probably as perfect a breed as ought to be introduced for a considerable time to come.

If Scotland cannot boast of as valuable breeds of farm-horses as England, it may at least contend for possessing as great varieties. It has

#### **The Lanark or Clydesdale;**

#### **The Garron;**

#### **The Galloway;**

#### **And,**

#### **The Small Highland Horses.**

Lanark is the only county in Scotland which can be said to possess a valuable breed of plough horses. The reason of which is ascribed to an adventitious circumstance that happened in that district about the end of the last century. One  
of

of the Dukes of Hamilton brought over fix coach horses (stallions) from Flanders. By crossing these with the best of the country mares, the breed, now so well known by the name of the Clydesdale, was produced. The Clydesdale horses are probably inferior to none in the island, either for the cart or the plough. They are from fifteen to sixteen hands and a half high; strong, active, and steady in harness. From Clydesdale, and some of the neighbouring districts, the farmers in the south and south-east parts of Scotland are supplied with horses. Many are sold for the coach and the saddle, and considerable numbers are also sent into England.

The Garrons are the ancient breed of country horses, without having been improved by crossing with other breeds. Horses of this description are still common in those cultivated districts, which lye adjacent to the mountains, and where the more improved modes of husbandry have not been generally introduced. They are a strong hardy race, rather under the middle size, and partaking more of the form of the Suffolk punch, than of the clean-boned, fine shaped, Cleveland bay. They measure about fourteen or fourteen hands and a half; and with due attention, might be rendered a very valuable breed.

The



The Galloway horses are much about the height of those last mentioned, but superior in shape, and lighter in bone. They are extremely well calculated for the road, as they move easily, and are capable of enduring very great fatigue. The superior excellence of the Galloway breed is said to be owing to the following circumstance: Some ships of the Spanish Armada, loaded with horses, having been wrecked on the coast of Galloway, several stallions were thrown ashore. These, having been crossed with the country mares, produced the breed so well known under the name of Scotch Galloways, but which, owing to inattention, is said now to be greatly degenerated.

There are two sorts of horses in the Highlands of Scotland; the smallest are to be found in Zetland, Orkney, Caithness, and the western islands. They are seldom above nine or ten hands high; and although hardy, they are, like the small Welsh ponies, very useless animals, being too small for the plough, or indeed for performing properly any operation of husbandry. The other sort are common in the Highlands of Perth, Argyle, Aberdeen, and Inverness. They are considerably larger, being between thirteen and fourteen hands; but as no attention is bestowed on improving the breed, and as they are miserably mismanaged in every stage of life, they cannot

cannot be considered either as a valuable or profitable stock.

These are the distinguishing characters of the breeds of horses employed in the operations of husbandry in these kingdoms. It will be universally allowed, that wherever horses are employed in agriculture, it becomes the business of every farmer to adapt the size and strength of his horses to the business he has to perform. The writer has long been of opinion, that many English farmers sacrifice too much to show, if the expence of keeping, the slow movement, and the additional risk from accidents or death, which attach to the keeping the large high priced black cart-horses, be considered, those farmers who prefer them to the compact, active, hardy sorts, whether the Cleveland, the Suffolk, or the Clydesdale, which are the three sorts in the island best calculated, in every respect, for the farmer's use, will find, that their predilection for these large fine horses is attended with a very heavy extra expence. The value of a horse ought to be estimated by the farmer, not so much according to the price at which he was purchased, or at which he might be sold, as according to the extent of work which he will perform without being fatigued. If, for instance, a pair of Suffolk or Yorkshire horses will plough two acres a-day during the seed-season, they are more valuable for labour than a pair of

large

large heavy Lincolnshire horses, that are hardly able to perform half the work : While the first cost, the expence of keeping, and risk of accidents, is very considerably less. If this reasoning be just, it will occur to every reader, that the whole under sized tribe of horses, particularly those reared on the mountains of Wales, and in the remote Highlands of Scotland, are of little value, either in an agricultural or commercial view. Were these unimprovable districts occupied in the rearing of black-cattle and sheep, it would be infinitely more advantageous for all concerned. Lands, devoted to the rearing of such useless animals as those small horses, may be denominated wastes, in every sense of the word.

A particular, and much respected, friend of the writer's, Mr George Culley of Eastfield in Northumberland, published a Treatise on Live-Stock, some years ago. Very few persons in Great Britain have studied the subject so much ; perhaps with one exception \*, none ever bestowed more attention, or shewed greater perseverance, in pursuing the useful and laudable business of improving the breeds of the different species of live-stock, to such an extent, and with greater success. It may therefore be agreeable to such readers, as have not seen the above-mentioned Treatise, to peruse Mr Culley's description, of a well-formed horse,

VOL. III.

Q

and

Mr Bakewell.



and which cannot fail to be the more agreeable, as it is free of those technical terms, which are so commonly used in descriptions of this sort. This eminent breeder observes, that whatever be the variety of the breed, the form should answer the following descriptions, *viz.* His head should be as small as the proportion of the animal will admit; his nostrils expanded, and muzzle fine; his eyes cheerful, and prominent; his ears small, upright, and placed near together; his neck, rising out from between his shoulders with an easy tapering curve, must join gracefully to the head; his shoulders, being well thrown back, must also go into his neck (at what is called the points) unperceived, which perhaps facilitates the going much more than the narrow shoulder\*; the arm, or fore thigh, should be muscular, and, tapering from the shoulder, meet with a fine straight, finewy bony leg; the hoof circular, and wide at the heel; his chest deep, and full at the girth; his loin or fillets broad and straight, and body round; his hips or hooks by no means wide, but quarters long, and tail set on so as to be nearly in the same right line at his back; his thighs strong and muscular; his legs clean and fine boned,

the

\* Whoever has observed a greyhound or a hare, will perceive, how very wide they are made at the upper part of the shoulders, and there are few animals that move with so much ease and swiftness.

the leg bones not round, but what is called lathy or flat\*.

In regard to the properties of a breeding mare; she should be well shaped; possess a gentle disposition; have a large carcase, conform to her height; pretty full bellied, and likely to become a good nurse, that is, to have plenty of milk. In common it is too much the practice to be more attentive in the choice of a stallion than of a breeding mare. This conduct is improper, in so far as it is known, from general experience, that, in regard to form, and other good qualities in the progeny, more depends on the mare than on the horse. It is of importance to make choice of a stallion as similar in colour and form to those of the mare as possible; by following this method, there is a much greater probability that the foal will possess the joint properties both of father and mother, and turn out more agreeable to the wishes of the owner, than when violent crosses are attempted.

When a half bred mare, for instance, is put to a great heavy clumsy cart horse, or *vice versa*, the stock turns out a kind of mongrel or bastard breed, seldom possessing, in any considerable degree, the strength or size of the one, or the spirit, activity, and fine bone of the other.

In

\* See Mr Culley's Observations on Live-Stock, second edition, p. 21.

In short, although crossing the breeds of horses has, upon the whole, been productive of good consequences, notwithstanding it has been often injudiciously conducted, yet those who have adhered to the rule above mentioned, will be found, in every instance, to have proceeded farthest on the road to perfection. If the great cumbersome cart-horse of Lincolnshire be found too large in size, and too slow in motion, for performing the operations of ploughing, harrowing, &c. with the requisite expedition, why attempt to reduce his size, or increase his activity, by unnatural crossing with the smaller, more spirited, and more useful breeds of other districts? The better way would be, to make choice of a breed possessing naturally the greatest number of the wished-for qualifications, to which, by proper management, might also be added, by degrees, and with infinitely more certainty, any particular properties which were deemed wanting.

Palladius and Varro both direct, that a mare should not be allowed to take the horse before she be two years old, nor after she is ten; because, say they, when past that age, a weak and unprofitable breed may be expected. Palladius also directs, that the stallion should be pampered and kept high with food; and adds, that if he be not allowed to cover till he have complet-



ed his fourth year, he will last very well till his twentieth.

The practice of the horse-breeding farmers in these kingdoms, is nearly agreeable to the rules laid down by these Roman writers; the only material difference being, that the mares are not suffered to take the horse, till they be three or four years old; but continue to breed to a greater age than that above mentioned.

The usual season when a mare covets the horse, is from the beginning of April to the beginning of July: The month of June is considered the best season in Great Britain; although from the middle to the end of May is more approved of on the Continent, particularly in Normandy, where the farmers devote much of their attention to this branch of husbandry; and in which, in regard to useful farm-horses especially, they have succeeded, perhaps, beyond those in any other part of Europe. The above difference, as to the time when a mare should be allowed to take the horse, in the different countries, is easily reconcilable: A mare goes eleven months and a few days with foal; and the great object with all farmers, where practicable, is, to have the mare covered at such a period, as to insure abundance of grass, and the return of warm comfortable weather, before the foaling season.

In

In some districts, it is usual to give over working a mare, some few weeks before the time at which it is expected she is to drop her foal. It is, however, by no means a common practice. In Yorkshire, and in those midland counties, where the breeding and rearing of horses are better understood than in any other part of the island, they are often worked till the very time of foaling. Great care is necessary, in working and managing a mare heavy with foal: An over-heat, too severe exercise, a fright, or a sudden and violent jerk, are very apt to cause an untimely birth, whereby the foal is lost, and the life of the mare very much endangered.

It is generally understood, and is an opinion, it is believed, well-founded, that a mare may be covered on the ninth day after she has foaled, with a greater certainty of success than at any other period. This practice is often followed; but in such cases, the mare ought to be fed in an extraordinary manner, otherwise it is impossible she can do justice to her present and her future foal. Probably modern farmers would come nearer their purpose, were they to follow the example of the Romans, and content themselves with one foal in the two years. In England, and in the improved parts of Scotland, a mare after having foaled, is turned, together with the foal, into a pasture-field, and is allowed two or three weeks rest, before she is again worked,

worked, either in plough or cart; the foal being allowed the meanwhile to suckle at pleasure. After having had a few weeks rest, the mare is again worked in the usual manner; the foal being commonly shut up in a house during the hours the mare is at work. In Yorkshire, some farmers are particularly careful not to allow the mare to go near the foal, after her return from labour, till her udder has been bathed with cold water, and not till most of the milk is drawn from it. These precautions are used, with a view of preventing any bad consequences from the foal's receiving over-heated milk. Another practice, and which seems superior to the other, is also common in Yorkshire, and in many parts of Scotland: After the foal is a few weeks old, and has acquired strength and agility enough to follow its mother, it is allowed to attend her in the field, during the hours of labour, and to suckle occasionally. By this means, the foal receives sufficient exercise; nor can any prejudicial effects happen from the over-heated state of the milk, as the foal is allowed to draw it off repeatedly, and at short intervals. These may be considered as the general modes of management, in those parts of Great Britain above mentioned, during the period while the foal is allowed to suckle its dam, which is usually about six months; that is, from the time of foaling



foaling till Michaelmas, which is the period at which foals are generally weaned.

In the mountains of Wales, and in the Highlands of Scotland, the management is very different. There, the breeding mares are never worked during the summer. They are driven to the hills and mountains, at the close of the barley-feed season, where they remain, till the inclemency of the weather force them to return for shelter. But their scanty subsistence, the labour they are subjected to in procuring their food, and the moistness and coldness of the climate in the latter part of the season, render both themselves and their progeny of little value.

The method of treating foals in England, after they are weaned, is to put them immediately into a good fresh pasture, where they remain as long as the weather continues moderate. On the approach of winter, they are fed with a sufficient quantity of hay, placed in a stable or hovel, erected in the field for the purpose, and into which they have free access at all times. The next summer they are put into other pastures, commonly the most indifferent on the farm, where they remain till the beginning of the following winter, when they are either allowed to range in the pasture-fields, or brought home to the straw-yard. The inclemency of the winter in Scotland, and the great  
falls

falls of snow which generally take place, renders it necessary always to house the foals during that season. They are fed, for the most part, on straw, and have an allowance of corn once or twice a day. Sometimes hay is allowed them, in which case corn is considered as less necessary.

The time for gelding colts is usually the same in both kingdoms, namely, when they are about a year old. Although in Yorkshire, this operation is frequently suspended till the spring of the second year, especially when it is intended to keep them on hand, and without employing them in labour till the following season.

Young horses are sometimes trained to work at two, but more frequently not till three years old. The first thing is, to teach them docility, by leading them frequently to and from the watering-place. The work in which young horses are usually employed, is harrowing; to which they are inured by degrees, not being kept at labour above one-half the day, for the first few weeks; and afterwards worked only very gently, for the remainder of the season.

It was observed, when giving a geographical and agricultural description of the different counties in England, that it was a common practice, for the breeders of horses to dispose of the young stock at two or three years old, to farmers in the southern districts, who, after keeping and working

them for a like period, disposed of them to dealers from London, and other large cities. This kind of traffic is very common, and is equally convenient and advantageous for all the parties concerned. The breeder, by meeting a ready and constant market for his young colts, at the periods when he wishes to dispose of them, is enabled to continue breeding a regular number, without the risk of being overstocked. The farmers who are the first purchasers, may dispose of their stock of horses to the London dealers, when proper opportunities offer; as they are certain that a supply of young horses will arrive in sufficient time for answering their purpose. The London dealer, again, in place of travelling to the northern districts of England, where the greatest number of young horses are reared, can supply himself with such as are more suitable for his purpose, in the counties in his near neighbourhood. Besides the parties more immediately interested in this trade, there are generally no less than two agents, who make a living by carrying it on. The first is the *jockey*, or *jobber*, who purchases the colts from the breeder, and disposes of them to the south country farmer. The second is the dealer, in the neighbourhood of London, who either makes the purchase from the south country farmer, on his own account, and stands the chance of a sale in London, or who purchases on commission,

for



for behoof of the London dealer. The trade of buying and selling horses, is also carried on in Scotland, by the same description of people; and of whom it may be said, as well as of their brethren in England, that they are *knowing hands*. Probably it would be difficult to determine, whether the professional horse-dealers on the south or the north side of the Tweed possess the greatest knowledge of the *arts* usually practised for making up horses for sale. The methods practised by the jockies in the North Riding of Yorkshire, is thus described by Mr Tuke, who wrote the Report of the State of Agriculture in that district. "They (the young horses) "are usually sold with their full tails to "dealers, who afterwards make them up more "according to art. *The first business is, to draw "their corner teeth; in order to make three and "four years old horses have the mouths of those of "five.* They also undergo the operations of "docking and nicking; and after having been "kept two or three months on mashes, made of "bran, ground oats, or boiled corn, they are "sold to the London dealers, who, it is said, sell "these three or four years old horses, as if they "were five years old. They are then taken into "immediate work, either for the coach or saddle; and in a few months are completely destroyed, by this premature and too severe labour." Mr Tuke seems sensible, that the drawing of the

the corner teeth of young horses is done with a *fraudulent intention*; but appears anxious, at the same time, to exoner the dealers in the North Riding of Yorkshire, and to saddle the London gentlemen of that profession with the blame. After the above account, he immediately adds, "The drawing of the teeth is not a fraud practised on the London dealers: They know the deception, and insist upon its being done by the country dealers. It is requisite to be done some months before the London dealers finally sell them for use, or the tooth which denotes a horse to be five years old would not be grown, consequently the deception could not have taken place."

Although this practice of drawing a horse's corner teeth, in order to make him appear older than he really is, has scarcely never been attempted by any horse-dealer in Scotland, yet that fraternity are much belied, if some of the members do not occasionally adopt means as *honourable*, to effect a purpose diametrically opposite; namely, to make an old horse look younger than he really is. The means adopted to effect this laudable end is, (when a horse becomes so old as to lose the usual mark in his corner teeth, by which his age, till he be seven or eight, is usually ascertained), to drill a hole, or burn out one with a hot iron, in the corner teeth, as similar in size and form to the natural cavity

cavity as possible ; which, when done with any degree of judgment, is sufficient to impose on such, at least, as have not served an apprenticeship to the horse-jockey trade ; or who are not in possession of other rules of judging, than those on which the generality of farmers rely.

Where no arts are used to deceive, the usual manner by which the age of a horse or mare is ascertained, is, by examining their teeth. These are forty in number. Of these, twenty-four are double teeth, called grinders ; four tushes, and twelve fore-teeth. From the fourth to the eighth year, the age is known by the fore-teeth, and afterwards can only be determined by the appearance of the tushes. The fore-teeth begin to appear when the foal is ten or twelve days old. These are called the foal teeth, and are short and somewhat round.

They drop out at different periods ; and are afterwards replaced by others. Between the age of two and three years, a colt sheds the four middle fore-teeth ; two in the upper, and two in the under jaw, and the following year four others, one on each side of the former. The following year, again, four teeth drop out, next to those which were last shed, and are replaced by four others, which are called the corner-teeth, and by which, as has been observed, the age of a horse is afterwards known for three or four years. These four teeth, (each being the third, reckoning



reckoning from the middle of the jaw), are easily distinguished from the others, by being hollow, and having a black mark in the hollow or cavity.

These marks gradually diminish till the seventh or eighth year, when the cavity is filled up, and the black mark or spot entirely disappears.

The tusks, which are these next to the corner teeth, afford then the only rule by which the age of a horse can be determined with any degree of certainty. They begin to shoot when the animal is about four years old, and appear sharp in the points till it be six or seven. Between the ninth and tenth year, those in the upper jaw become blunted, and increase in length; and as the gum begins to contract considerably, the longer the tusks appear; and of course, the more of them that appear, the older is the horse. Nothing, however, but experience can enable a person to judge with precision, respecting the age of a horse. In justice to the horse-jockey tribe, it should be observed, that in many horses, the black mark or spot in the corner-teeth is never entirely effaced, so that a careless observer may in some cases be mistaken, unless he attends to the following circumstance, which universally happens, *viz.* that the hollow or cavity of the corner teeth is completely filled up, and that the tusks of an old horse never fail to have the appearance above described.

The

The diseases to which horses are liable are numerous; and some of them of a very infectious nature. These will be found treated of at great length in various books of farriery, where also the best means of prevention and of cure are explained. It shall only be remarked here, that many of the diseases to which horses are subjected, are brought on by over-exertion, and after-mismanagement. Where neither of these are permitted, farm-horses in particular generally enjoy an almost uninterrupted state of good health, and live and are useful to an old age. This remark naturally leads to making some observations on the management of farm-horses, in regard to food, dressing, and exercise, and with which it is intended to conclude the section.

There are few parts of Great Britain where a more useful race of farm-horses is to be found than in the Carse of Gowrie; fewer still, where, considering the tenacious nature of the soil, more land is usually ploughed, with the same strength, (two horses constituting the team), and perhaps none in which farm-horses are better fed, or managed with greater attention. For these reasons, it is proposed to detail the mode of working and treating horses in that district.

In the spring, when the seed-season commences, the hours of labour are increased, and food superior in quality to that on which the working horses were maintained during winter, is allowed.

ed. They are then generally fed on pease-straw, or on hay; and, besides at least half-a-peck of dry oats, or of oats with a mixture of pease or beans, which is given to each horse in equal portions, when they return from the field, morning and evening, a stated allowance of the refuse or dressings of the grain, after having been mixed with chaff, and either soaked in cold water, or boiled, is also given every morning and afternoon, before labour commences\*. Thus, during the height of the seed-season, the farm-horses in the Carse of Gowrie are regularly fed four times a-day with corn.

In summer, they are kept constantly in the stable, except during the hours of labour, and are allowed as much cut clover as they are able to eat. In autumn, during the hurry of the wheat-feed season, as well as when the corns are carrying home to the stack-yard, an allowance of corn is also given, and which is continued in considerable quantities as long as the weather continues favourable for ploughing. On the commencement of winter, and when labour begins to slacken, the horses are commonly fed on straw,

\* In place of performing all the labour of the day at what in England is called one journey, throughout the whole of the year, the farm-horses in Scotland go two journies from the middle of March till the end of September: A much better method certainly, as thereby the labour is divided, and the horses are allowed to rest for four or five hours during the heat of the day.



straw, the allowance of corn being limited to about half a peck a-day; on many farms, the allowance of corn is wholly withdrawn, and potatoes, properly cleaned, substituted in its stead. The farm-servants in this district, partly owing to the strict injunctions they receive from their masters, and partly from a laudable pride which they possess, of having their horses look better than those of their neighbours, are very careful in cleaning the horses of which they have charge. On returning from the field, they regularly make them, (after allowing them time to drink), walk through a pond, to wash off the dirt from their legs; and when put into the stable, and the harness taken off, they rub them pretty smartly with some clean straw; and afterwards, when in condition for currying and dressing, these operations are performed with a very considerable degree of attention. With such treatment, and when horses are not over-heated, they will undergo an immense degree of fatigue. At the same time, the more personal attendance a farmer bestows on his horses, the better they will thrive. And if he will always bear in mind the old proverb, that "the master's eye makes the horse fat," there is little reason to doubt but he will be able to conduct the various operations of husbandry with more ease, and at less expence, than if he were negligent in this respect.

## SECTION II.

*Cattle.*

AT what period Britain was stocked with cattle, or who were the first importers, it is impossible to determine. For the reasons already mentioned, there can be no doubt, that the Romans not only increased the number by new importations, but were also attentive to the improvement of the original breed. That people, we know, from their agricultural writers, were very competent judges of the valuable properties of which cattle ought to be possessed. The ox was with them the chief beast of draught. Columella is very particular in his account of cattle; and the directions given by Palladius for chusing an ox, would not disgrace the most eminent breeder of modern times to give.

The practice of using oxen in the plough, was almost universal all over this island, for many ages. It is only within this century, indeed, that ploughing with horses became common. In Scotland, in particular, it is little more than forty years, since the practice of using horses only in the operations of husbandry, was introduced.

The

The chief varieties of cattle in England, fall under one or other of the following denominations, viz.

The long-horned.

The middle-horned.

The short-horned.

The Suffolk Duns,

and

The Welsh Cattle.

It is highly probable, the first of these breeds, viz. the long-horned, originated in importations of cattle from the neighbouring country of Ireland; and that bulls and cows brought from that island, having been coupled with the ancient breed of the district, produced the sort of cattle known by the name of the Lancashire or long-horned, and which now occupies a large portion of the pasture-lands of England.

Besides Lancashire, the long-horned cattle are also very general in the counties of Warwick, Leicester, Gloucester, Chester, and several others of the midland counties; and what is surprising, and shews great attention in the one instance, and equal neglect in the other, this sort of cattle are said to be found in greater perfection in the county of Leicester, than in the district whence they take their name.

The Lancashire cattle are remarkable for the length of their horns and hair, and the thickness



ness of their hides. In size they are superior to the Suffolk Duns, but inferior to the short and middle-horned. In respect to quantity of milk, not equal to the Suffolk breed, but superior to the other two. In disposition to fatten, exclusive of some individuals that are peculiarly well formed, they rank, so far as the writer has had access to know, from his own experience and observation, or to be informed from respectable authority, lower than any other breed in Great Britain.

The middle-horned breed of cattle, are in possession of the south and south-west parts of England, as Sussex, Dorset, Hants, Devon, &c. and have also got so far north as Herefordshire, in which district the largest cattle of this sort are to be found. It appears extremely probable, that these cattle are the descendants of those which the Romans were in possession of during their residence in the island. The original breed would no doubt be removed by the ancient Britons unto Wales, when they were forced to retreat into the fastnesses of that country, to avoid the invaders. Be that as it may, when all the properties which should attach to a useful breed of cattle, are considered, the middle-horned may be said, as a general variety, to come nearer to perfection than any other in England. They are of a large size, well formed, steady in harpels or draught, and possess that exertion and  
agility

agility so necessary in a labouring ox. In disposition to fatten, they are probably much on a par with the short-horned, and greatly superior to the Suffolk. As dairy-cattle, they are as valuable as any that fall under the description of quick feeders; for although they give a less quantity of milk than the Suffolk or long-horned, it is said to be of a richer quality.

The short-horned cattle are chiefly to be found in Lincolnshire, and the eastern parts of the counties of York, Durham, Northumberland, and Berwick. This breed, in consequence of its having been originally imported from Holland, is called the Dutch, and sometimes the Holderness breed, from a place of that name in Yorkshire, where it would seem it was first established in this country. They form a contrast to the long-horned cattle in other particulars besides their horns; they are larger and thicker in the mould or carcase, have very thin hides, and short hair; they evince a disposition to fatten quickly, and also afford a great quantity of tallow; properties which the Lancashire cattle possess in a very inferior degree. Destitute of the exertion and agility of the middle-horned sort, they are not so well adapted for the cart or the plough. They are not remarkable for the quantity of milk; on the contrary, considering their size, and the quantity of food they devour, it is probable they are inferior to  
any

any of the other sorts above mentioned: When compared with the Suffolk Duns, greatly so. Some individuals, as Mr Bakewell, Mr Fowler, Mr Paget, &c. bestowed much attention on the improvement of the long-horned breed of cattle. But it is probable, a greater number of eminent breeders have of late embarked in the laudable undertaking of improving the short-horned breed; and from their knowledge, assiduity and attention, much may be expected. Mr Charles Collings at Kettens, near Darlington, is at present in possession of the best breed of short-horned cattle in England\*; and his abilities and intelligence are fortunately such, that his stock will, in all probability, long go on in a progressive course of improvement.

Whether the Suffolk cattle, which are all polled, are an accidental variety, picked up at some period or other, and for the singularity of colour (dun), bred from, or whether the breed was

\* Mr Collings is in possession of a cow, for which the writer heard him refuse 150 guineas; and of a calf, for which he was also offered 60 guineas, when under three months old.

These are incitements, that, when added to the satisfaction that must arise in the mind of a man of Mr Collings's character, from the reflection of having rendered an essential service to his country, are more than sufficient to induce him to persevere in the path in which he has set out.



was originally imported from the Continent, the writer cannot undertake to determine. He rather supposes, however, from some circumstances he was informed of a few years ago, when in that district, that the original breed was imported from the Continent. This description of cattle are considerably smaller than any of the sorts above mentioned. They are celebrated, and very justly, for the quantity of milk they give, which, from their size, from 45 to 50 stone (of 14 lb.), is greater than is given by any general breed of cows in either kingdom. Some individuals will yield seven or eight gallons in the day; but, what is much more extraordinary, a whole dairy of cows, such at least as are in milk, and to the number of thirty or forty, will give five gallons a-day, for two or three months together; that is, in the height of the grass season. The Suffolk cattle are not, however, a valuable breed: Their form is very plain; hence it is extremely difficult to fatten them; and although the quantity of milk which they yield is great, yet it is very thin, watery, and indifferent in quality\*. They are therefore not only less valuable to the gra-

zier.

\* This is not peculiar to the Suffolk cows; the same complaint holds against all deep milkers; and it is a very mistaken idea to suppose, that all milk is of an equally rich quality.—Three gallons of some cows  
milk

zier and the butcher, but they give more trouble to the dairyman, whose returns in butter or cheese are less than, on similar pastures, a like number of cows of any other breed would produce.

In describing the Welsh cattle, the writer has chiefly in view those of Cardiganshire, as he has had opportunities of seeing more of that sort, than of any other bred in Wales. They are mostly black, with thick horns, turned upwards. They are of a small size, clean-boned, of a good shape, especially where the native breed has not been injured, by injudicious crossing with others from England. They are hardy and active; and are in great request in the southern counties of England, on account of their being quick feeders. The quantity of milk is trifling; but they are, upon the whole, a breed well adapted to that country, although still capable of very great improvement; which might be effected with more certainty, and to a greater extent, by selecting the best individuals of the native breed, than by bringing others, possessing probably very different qualities, from England.

Exclusive of the short-horned breed, which is common in the county of Berwick, and in the low milk, will produce an equal quantity of butter or cheese, that five of many others will do, on the same pasture.—Of this more hereafter.

low part of Roxburghshire, there are other three distinct varieties of cattle in Scotland ; as

The Low-Country Cattle ;

The Highland Cattle ;

and

The Galloway Cattle.

The Low-Country cattle, are those in the counties along the eastern coasts, from Berwick to Nairn ; and including also those in the districts situated on both sides of the Forth and the Tay. The cattle sent from this extensive district into England, are all denominated Fifeshires, or Fifeshire *runts*. They are no doubt what this term imports, " dwarf animals," compared with the general run of the large cattle in England ; but what is worse, they are a cross-mixed, coarse breed ; insomuch that, except in the county of Fife, there is scarcely a distinct variety discernible. The general introduction of two-horse ploughs, put a stop to the laudable emulation for keeping fine oxen, that prevailed before that period. The farmers became careless about the breed of cattle ; and a mixture of breeds was the consequence, the crosses not having been conducted with judgment, but rather taking place as the chapter of accidents directed. Symmetry of form, size, strength, and almost every good property, are so much im-



paired or lessened, that it will require a long period, and much attention, to bring the breed of cattle in these districts, to the same degree of perfection at which it had arrived thirty years ago. Such, however, are the consequences that may always be expected to result from a general inattention to the breeds of live stock. It is with regret the writer feels himself obliged to make such a statement, in regard to the breed of cattle in his native country; but truth demands it. There are some individuals, it is true, who have bestowed considerable attention on this important branch of rural economy; but the number is very small; and while the English farmers, and those in Berwickshire, are exerting every nerve, to rival one another in the best breeds of live-stock, there is a supineness, a negligence, reigns among even the most intelligent farmers in the other parts of Scotland, that is truly surprising.

As you recede from the level and better cultivated parts of the country, and approach the mountainous districts, you leave this motley breed of cattle, and fall in with another, which, although smaller in size, is pure and unmixed: The Highland cattle are known in England by the name of *Kyloes*; (probably from a district in Ayrshire, called Kyle, where that sort of cattle prevail,) and are highly esteemed by the graziers in that country, for their disposition to fatten. This  
sort

fort of cattle are common in the highland parts of the counties of Dumbarton, Stirling, Perth, Aberdeen, Banff, and Moray, and in Argyle, Inverness, and all the northern districts. They are very hardy, well-shaped; and their beef is so superior to that of the large English cattle, that it always sells at a higher price\*. The Isle of Sky cattle are the smallest in size, but the most perfect in every other respect, not only of the Kyloe sort, but of any in the British dominions. This assertion is not founded on the writer's own particular knowledge or judgment, but on the authority of the best judge of his time,—the late Mr Bakewell, whom he has heard repeatedly declare his sentiments on the subject, and to that effect. If it should be asked, how it happens that the cattle in the most remote, and, it may almost be added, the least cultivated part of Great Britain, should possess a greater share of the properties which constitute what may be denominated a perfect breed, than any of those in the more fertile parts of the country, the answer appears easy:—The breed in the Isle of Sky is the original breed of the district,

\* The waiters, at some of the country inns in England, when a traveller asks them for a bill of fare, frequently informs him, that he can have some Kyloe beef, which they consider as a great feast.

strict, pure, and unmixed with any other\*; whereas, not only in that part of Scotland above mentioned, but everywhere in the cultivated parts of Great Britain, cross breeds have by degrees crept in, and maimed the original breed so much, that, even in a country where a particular breed predominates, there will be found endless varieties.

The Isle of Sky cattle, having been pronounced by so respectable authority, to be upon the whole superior to any other in Great Britain, and greatly deficient only in one particular, "size," it is certainly an object of national importance, to endeavour, if practicable, to remove this obstacle to the more general establishment of the breed. This can be best effected, under the judicious management of an expert English breeder: Were a Honeyborne †, a Culley, or a Collings, to undertake the task, if the experiment proved successful, of which there is little reason to entertain a doubt, it would go a great way to establish a most important point; namely, what, in a great national point of view, is the best breed of cattle.

The

\* This is a strong argument in favour of Mr Bakewell's opinion, that breeding from the same stock, is much better than crossing one breed, or rather one variety of the same breed, with another.

† Mr Bakewell's nephew and successor.



The only other distinct variety of cattle in Scotland, are those bred in Galloway, and which in England are denominated Galloway-poles. They are of a short compact form, in size somewhat above the Suffolk cattle. They are not so deep milkers as them, but the quality is much superior. In the list of cattle that possess a disposition to fatten, they stand high; and, what is not less in their favour, they not only lay their fat upon those parts of the body that sell highest at market, but the whole carcase when cut up, has also a marbly appearance, being everywhere mixed with fat. This valuable breed is not so numerous, nor so pure, as formerly. Attempts at farther improvement, conducted too often without judgment, and frequently without having any determinate object in view, have been the means of introducing many cross breeds, a circumstance which has tended materially to injure the parent stock. The Galloway breed of cattle is not confined to the district of that name. This sort of cattle are to be found in considerable numbers in Dumfries and Ayr shires, especially towards the borders of Galloway and Kirkcudbright. More remote from these last mentioned districts, that is, in the north division of the county of Ayr, the eastern part of Dumfries-shire, and in the counties of Lanark, Peebles, Selkirk, &c. the breeds of cattle are considerably mixed. They are, however, in general, of the Kyler fort,

2

with

with crosses from the Galloway, the long-horned from Cumberland and Westmoreland, and from the different varieties in the low parts of Scotland.

From the above general description of the British cattle, it will naturally occur, that all the sorts taken notice of, are not equally profitable to the breeder, the rearer, the dairyman, the grazier, the butcher, or the consumer. Some have a greater disposition to fatten than others, Some being cleaner boned and better formed, have less offal. Some give a greater quantity of milk than others. In a word; some of the particular properties for which cattle are estimable, are more discernible in one breed than in another. Whether these can be all united in the same animal, or whether a breed of cattle possessing all the requisite qualifications, would be equally suitable to all situations, are questions not easy to be determined.

In regard to the first, it seems universally agreed, that there are two properties for which cattle are esteemed valuable, that cannot be united; that is, a disposition to fatten, and a tendency to yeild a large quantity of milk. The form of the animal most remarkable for the first, is very different from that of the other; in place of being flat in the sides, and big in the belly, as all great milkers are, it is high-sided and light-bellied. In a word, its body is barrel-formed,  
while

while that of the other is more fitted to embrace a horse collar, with the wide side downwards. It is not probable, therefore, that the properties of two breeds of cattle, so opposite in form and general appearance, can ever be united in the same animal. If a large quantity of milk, whatever be its quality, is the object, the dairyman must content himself with such plain ill-looking animals as above described.

It was formerly hinted, that the milk of all cows was not of the same quality. This is an incontrovertible fact, in so far as the quantity of butter, or of cheese, that can be extracted, is a proper criterion by which to judge. The richness of milk, no doubt, depends in a very considerable degree, on the age and quality of the pasture, but more on the nature and constitution of the animal; and although the fact, it is believed, has not been ascertained by any accurate well authenticated experiments; yet, it appears highly probable, that in proportion as the cows of the milking tribe exceed those that are more disposed to fatten in quantity, in nearly the same proportion will their milk be inferior in quality\*. If this should prove to be the case, the superiority of the quick feeders, one would suppose to be completely established; as, while cattle of this description, are confessedly better for the purposes of the graziers, the butchers, and the consumers, they would, if this point were

\* See next chapter.



were determined in their favour, be also more valuable for the dairy. No person will think of asserting, that a gallon or two of whey, or of butter-milk extra, (for the question comes to that), is a sufficient reason for preferring a breed of plain-looking, ill-formed cattle, to one that, except in this particular, is more valuable in every respect. In a word, no person, who pretends to a knowledge of the different breeds of cattle, will think of supporting an opinion so erroneous, as, that cattle which are disposed to fatten quickly, and at an early age; that from the superior excellence of their form, have a small proportion of offal, or what the breeders call non-essentials; and that although they yeild not a large quantity of milk, yet make up for that deficiency in the richness of its quality; are not more valuable than those which have nothing to recommend them, but the single property of being great milkers. The Suffolk cows are known to be a distinct variety from any other breed in this country. Except from the circumstance of its being generally known, that unless in respect to giving a larger quantity of milk, they are inferior to every other sort; it is difficult to account for this breed of cattle having been confined for ages within so narrow a circle, as a part of a moderate sized county: Were it not for the numerous bad properties which they are known to possess, that one good feature in their character,

character, and for which they are greatly celebrated, would have long since been the means of spreading the breed through every dairy district in England.

Mr Young informs us, in his Agricultural Report of Suffolk, that the quality of milk which the cows in that district yield, is *more extraordinary than that of the butter*; this, in so far, corroborates the preceding statement. There are certainly some attentive breeders in that district, although by his account, the number is not considerable. It would be extremely desirable to ascertain, and no man is better qualified for the task than Mr Young, whether, in such instances as have occurred, where improvements have been made on the breed of Suffolk cattle, in regard to figure and bone, by crossing with other breeds, a decrease in the quantity of milk was not always the consequence? Further, Whether, as this cross breed assumed more of the figure of a quick feeder, the milk did not become richer in quality; or, in other words, yield more butter in proportion? and, lastly, What diminution in the quantity of butter, or of cheese, if any be supposed to take place in consequence of the quantity of milk being reduced by the improvement that takes place in the form of the animal? A solution of these questions, as they would in all probability turn out to be against the breed of great milkers, might have a good

effect in convincing the public of the inferiority of this breed, compared with the other ; and of the propriety of devoting the chief attention to the improvement of that, which, from a concurrence of such circumstances as above stated, shall be proved the most valuable.

Whoever peruses the Agricultural Reports of the various counties of these kingdoms, made to the Board of Agriculture, will be astonished to find in how few districts attention is paid to the improvement of any species of live-stock ; to find in how large a portion of Great Britain the domestic animals, particularly the cattle, are, as the honest Cumbrian said to Messrs Culley and Bailey, when surveying that county, ‘ *Sik as God set upon the land ;*’ or, in other words, the ancient breed of the country, handed down from generation to generation, and without any means having been adopted for improving them, either in size, shape, or value : ‘ *Lord, Sir,*’ added the same man, ‘ *we never change any.*’ It would have been fortunate had the farmers, on the low parts of Scotland, adopted the same rule : because although the breed of cattle, in that case, might not have been much improved, as it is only of late years that the farmers in that part of Great Britain, acquired any correct ideas in regard to the breeding branch of husbandry ; yet an endless confusion of improper and injudicious crosses would have been avoided, which, in all probability,



bability will mark the character of that country cattle for a long period yet to come. There is scarcely any person, who is possessed of cattle, that does not know that there are marks or rules by which to judge of a good bull ; but the number who can determine with precision what these are, is inconsiderable. For the information of such, Mr Culley's description of a bull is here subjoined.

“ The head of the bull should be rather long,  
“ and muzzle fine ; his eyes lively and promi-  
“ nent ; his ears long and thin ; his horns white ;  
“ his neck rising with a gentle curve from his  
“ shoulders, and small and fine where it joins  
“ the head ; his shoulders moderately broad at  
“ the top, joining full to his chin and chest back-  
“ wards, and to the neck-vein forwards ; his bo-  
“ som open ; breast broad, and projecting well  
“ before his legs ; his arms or fore-thighs mus-  
“ cular, and tapering to his knee ; his legs  
“ straight, clean, and very fine boned ; his cline  
“ and chest so full as to leave no hollows behind  
“ the shoulders ; the plates strong, to keep his  
“ belly from sinking below the level of his  
“ breast ; his back or loin, broad, straight and  
“ flat ; his ribs rising one above another, in  
“ such a manner as the last rib shall be rather  
“ the highest, leaving only a small space to the  
“ hips or hooks, the whole forming a round, or  
“ barrel-like carcase ; his hips should be wide  
“ placed,

“placed, round or globular, and a little higher  
“than the back; the quarters, from the hip to  
“the rump, long, and instead of being square,  
“as recommended by some, they should taper  
“gradually from the hips backward, and the  
“curls or pot-bones not in the least protuberant;  
“rumps close to the tail; the tail broad, well  
“haired, and set on so high as to be in the same  
“horizontal line with the back.”

When a proper selection is made of a flock whence to breed from, the cow is chosen in consequence of possessing the following properties: A proper size and constitution, according to the pasture and climate; her body being long; her belly round and large; and her udder white, soft, and not fleshy. Her being of the same colour with the bull, is also a circumstance that is considered as meriting attention.

Cows are frequently allowed to take the bull at two years old; but as they are not at that time arrived at their greatest strength or stature, it is more advisable to defer it till they are three years old. A cow goes nine months, and drops her calf, when in the regular season, from the beginning of March till the end of May. During her pregnancy she requires very little attention beyond what is necessary at other times. The most material circumstances to be attended to, are, to prevent her from leaping over ditches, hedges, &c. and to avoid frightening her, or giving her

her too violent exercise. At the time of the birth, nature does its part, and the interposition of art is rarely necessary, except in the case of the short-horned or Holderness breed, which seldom calve without assistance.

The treatment of calves, whether rearing or breeding be the object, is very different in different districts. Some of the methods adopted in both cases shall be described.

The method generally adopted of fattening calves, is to allow them to suckle. By this means, the object is not only sooner, but more effectually attained than by any other. The usual period deemed necessary for fattening a calf, is from seven to nine weeks; but in the dairy-districts, where milk is considered a valuable article, scarcely half that time is allowed. The only other usual method is to give them milk to drink; when that is done, the milk is given them morning and evening warm from the cow, and the quantity increased according to their age and strength. In either case they are kept in pens in a close house, and well littered. Sometimes a lump of chalk is laid in a trough, within their reach, by the licking of which it is supposed their flesh acquires a whiteness; a property which all connoisseurs in veal greatly admire. The veal-feeders are also in the practice of bleeding their calves repeatedly in the course of fattening; this is done for the same reason last mentioned; but



but although it may no doubt tend to give the veal a whiteness which it would not otherwise be possessed of, yet it must certainly render it less nourishing. In several parts of England, barley-meal, lintseed, boiled into a kind of jelly, &c. are given to calves in the course of fattening; but either of the methods above described are greatly superior, although, it must be allowed, considerably more expensive.

The usual method of rearing calves in Yorkshire, is by giving them milk to drink, there being few instances where they are allowed to suckle. For the first two or three weeks, they get milk warm from the cow; for the next two or three weeks, half the new milk is withdrawn, and skimmed milk substituted in its stead; at the end of that period, new milk is wholly withdrawn; and they are fed on skimmed milk alone, or sometimes mixed with water, till they be able to support themselves by eating grass or other food.

The practice in Cheshire, is to allow the calves to suckle for the first three weeks. They are afterwards fed on warm green whey, or scalded whey and butter-milk mixed; with the green whey, water is frequently mixed, and either oat-meal, or wheat and bean flour, is added. A quart of meal or flour is thought sufficient to mix with forty or fifty quarts of liquid. Oat-meal gruel and butter-milk, with an addition of skimmed milk,

are

are also used for the same purpose. Some one of these foods is given night and morning for a few weeks after the calves are put on that diet, but afterwards only once a-day, till they are about three months old.

In Gloucester-shire, the calves are not allowed to suckle above two or three days; they are then fed on skimmed milk, which is previously heated over the fire. When they arrive at such an age as to be able to eat a little, they are allowed split beans or oats, and cut hay, and water is mixed with the milk.

The method practised in Suffex is materially different from any of these above mentioned. There it is common to allow the calves, either to suckle for ten or twelve weeks, or to wean them at the end of three or four, and to give them a liberal allowance of skimmed milk for six or eight weeks longer.

The farmers in Scotland, although almost a century behind those in England as to the necessary attention in the selection of the best sorts of live stock, are entitled to praise in regard to their management of calves, when it is compared with any of the methods above mentioned. There are two ways in which calves are usually reared in that kingdom. The first is, by giving them a pailful, containing about a gallon of milk, warm from the teat, morning and evening, for 8 or 10 weeks. The second, which  
being

being agreeable to nature's rules, is preferable to any other that can be adopted, is to allow the calf to suckle its dam, as is sometimes done in the county of Suffex.

Calves, when dropt during the grafs-season, should be put into some small home close of sweet rich pasture, after that they are eight or ten days old, not only for the sake of exercise, but also that they may the sooner take to the eating of grafs. When they happen to be dropt during winter, or before the return of the grafs-season, a little short soft hay or straw, or sliced turnips, should be laid in the trough or stall before them.

The method of managing calves during the first winter is pretty generally the same in every part of the island. They are always housed. Sometimes they are bound up to the stall; but more frequently allowed to remain at freedom. Their food in England, chiefly hay; in Scotland, sometimes hay, but more frequently straw and turnips. They are turned out on some of the inferior pastures on the farm the following summer, and maintained the second winter on straw in the straw-yard, or in houses or sheds erected for the purpose. Some farmers in Scotland, who, from being situated at a distance from any market at which they can dispose of stall fed beef, very frequently give a considerable part of their turnip-crop to their young cattle.

This



This is an excellent practice ; and one that ought to be followed, even by those, who, from being better situated in regard to markets, can adopt other methods of using turnips to advantage. The benefit of green winter food for live stock of all descriptions has already been pointed out. It is, therefore, only necessary now to add, that there is probably no way in which turnips can be used, by which the farm or the farmer would reap greater benefit, than by giving the young cattle a daily allowance during the first two or three winters.

There is little variation in the management of young cattle from that above described, during the time they remain in the breeder's possession, which is longer or shorter, according as circumstances occur.

In some districts, it is the usual practice, as was formerly observed, to allow the young heifers to take the bull at two years old ; in which case, what are not necessary for keeping up the stock, are disposed of the following spring, before they drop their calves.

In some places, where the practice of ploughing with oxen is continued, or has been a second time introduced, young oxen are broken into work in the course of the second summer ; this, however, is by no means common. Probably nine-tenths of the cattle reared in Great Britain, remain in the breeder's possession till the

spring of the third year. The young cows are then disposed of to the dairy-farmers, who often do not breed a sufficient number to supply themselves, or to the cottagers, who have the means of keeping a cow in summer, but not in winter. The young oxen are sold, either for the purpose of supplying the ox teams, where these are still kept; or to the graziers, who sometimes fatten them for the butcher in the course of the grass-season, but more frequently content themselves with only putting them in condition to be stall-fed during the following winter. The premature age at which such cattle as are not employed in the operations of husbandry, are now fattened, is a positive evidence of the scarcity of that species of live stock, which is so generally said to prevail. Exclusive of the cattle used in the plough or the cart, which are permitted to live a year or two longer, the oxen in this country are in general killed before they are four years old, an age, at which it is well known, an ox does not fatten to the greatest advantage. Whether the scarcity of cattle arises from the increase of luxury among the middle and lower classes of people; or, that the rearing of this species of stock is not now so much an object of the farmer's attention, the writer will not pretend to determine. It is probably not owing entirely to one or both of these causes, but to a combination of these with several others. That it does exist, however,

however, is evident, not from the present exorbitant price, which can be easily accounted for, but from the rapid and regular rise that has taken place in the price of cattle for several years. The scarcity of cattle is an evil of a most serious nature; and, as it is increasing every year, merits perhaps more than any other single object the due consideration of the Members of the Board of Agriculture.

The various sorts of food with which cattle are fattened in these kingdoms, may be reduced under four heads, as grass, turnips, grains, and wash from the distilleries, and, lastly, oil-cake, corn, cut-chaff, &c.

Fattening cattle are usually put to grass in May or June, according to the season and situation in regard to climate. The period necessary for fitting an ox for the butcher depends on several circumstances, as the condition he was in when put to grass, the nature of the pasture, and many others; but in ordinary cases, an ox will be completely fattened in three months.

There is one method of fattening, connected with the grazing system, that the farmers in England are enabled, from the superior excellence of the climate, to adopt with success, which can never be attempted with propriety in Scotland. It is very common, at the close of the grass-season, when the fattening stock happen not to be fully in condition for the butchers, to render



render them so, by giving them hay two or three times a-day in the field, or in hovels erected for the purpose, into which they have access at pleasure.

When describing the modes of culture commonly adopted for raising crops of turnips, the uses to which they were applied were also mentioned. Therefore, all that is necessary further to state on the subject of fattening cattle on that root, is, that when put up to the stalls in proper condition, which, considering the season of the year, (November), must, with ordinary attention, always be the case, from ten to thirteen weeks is fully sufficient to render them fit for market.

The fattening of cattle with grains may rather be considered as a branch of the distillery business, than as connected with husbandry. There are, however, some instances wherein those who cultivate farms, practise this mode of fattening with a double view;—profit on the sale of the cattle, and the acquisition of a valuable treasure of useful manure. William Adam, Esq; who rents the farm of Mount Nod, near Streatham, in the county of Surry, has erected the most complete building the writer ever saw, for the purpose chiefly of fattening cattle on grains. In this building may sometimes be seen several hundred cattle. A detail of the management could not tend to general information: Suffice it to say, that the whole is conducted in a style,  
that

that evinces the man of genius, and the attentive farmer.

The only other method of fattening cattle, that remains to be taken notice of, is that of using oil-cake, corn, cut chaff, &c. This method is practised in many of the English counties; and, from every thing the writer could learn, with success sufficient to warrant farmers in other parts of the island to follow the same practice. The cattle are commonly put up to fatten at the end of the grass season. The usual allowance of oil-cake, after it is broken in a large mortar, or, in the fruit districts, in a cyder mill, is about half a peck *per* day, which is given, one-half in the morning, and the other in the evening, to which is added hay, and in some cases ground corn, that is, oats or barley of inferior quality, and cut straw provincially "chaff." As bullocks fattened in this manner, get regularly five, and sometimes six meals a-day, it is sufficiently evident, that, although it may be upon the whole an expensive mode of fattening, yet it must be both expeditious and effectual.

Although, considering the early period at which the cattle of this country are generally slaughtered, it is not now of so much importance to lay down rules, whereby to ascertain their age with precision, yet, in many cases, it must prove useful. The age of cattle, like that of horses, is discernible by their teeth. They lose

the first fore teeth at the age of ten or eleven months: These are replaced by others of a larger size; and when about a year and a half old, the teeth next to those in the middle drop out. These are also replaced by others; and at the age of three years, the others are renewed in like manner. They then appear white, even, and regular, and pretty long, becoming gradually black, unequal, and short, as the animal advances in age. Another mark, by which to determine the age of cattle, is the appearance of the horn. Cattle shed their horns at the end of three years; and towards the root of the second set of horns, there is a kind of ring or joint, formed every year that the animal lives afterwards: So that, reckoning three years for the top, or plain part of the horn, and one for every interval between the rings or joints, the most ignorant person may, with considerable certainty, ascertain the age of any ox or cow that has horns.

The number of cattle sent annually from Scotland and Wales into England, is immense, and may be considered as constituting the chief mean, by which the balance of trade with that kingdom, is kept in any degree of equilibrium. The cattle are purchased at the provincial fairs, by people who make dealing in cattle a profession or trade. Many of these people are respectable, as possessing not only property, but also intelligence,



telligence, probity, and honour; but in the list some may be found, who, from their conduct, would seem to have received their education at the horse jockey school.

In the low parts of Scotland, and in those districts of Wales adjacent to England, the cattle are sold for ready money, and the price actually paid at the delivery. A dealer in cattle, who, in these districts, should ask credit till his return from England, would be considered as in very doubtful circumstances. The trade is, however, carried on in a very different manner, not only in the remote parts of Wales, but also in the counties of Galloway, Argyle, Inverness, Ross, Sutherland, Caithness, Orkney, &c. There the drovers in general agree as to the price, when they receive the cattle; but the payment is deferred till their return from the south country markets, and is then made in whole, or in part, as they choose to find convenient. The losses and hardships, which the cattle-breeders in these districts sustain, are described in the following words, in the Report of the Island of Anglesey, in North Wales. "The practice of giving credit to the English drovers who purchase the cattle, is very general through all North Wales; by which means, the farmer seldom gets the money he bargains for; for when the drover returns, perhaps in a month or two, he always pretends to have made a bad bargain,  
" or

“ or has met with a dull market for the cattle ;  
“ for which reason, a discount must be allowed.  
“ But what is worse, some of them become in-  
“ solvent, or pretend so ; by which means, the  
“ industrious farmers are greatly hurt, and in  
“ some cases totally ruined.”

It is truly surprising, that the proprietors of these districts do not step forward at once, and put a stop to so nefarious a practice, which they must be fully sensible, is attended with the most direful consequences to many individuals whom Providence has placed under their peculiar protection.

The conduct of the proprietors of the Carse of Gowrie, a few years ago, on an occasion nearly similar, while it deserves praise, also merits imitation. Grain is the great article of produce in that fertile tract. It had been for many years the practice, for the farmers to sell their surplus grain on credit to the corn-merchants who resided either in the district, or in the neighbouring towns. Some of these having failed for very considerable sums, and the evil continuing to increase, the proprietors concerted among themselves ; and having called a meeting of their principal tenants, which was fully attended, resolutions were entered into, the import of which were, that in future, all grain was not only to be sold for ready money, but that the price should actually be paid on delivery.

These

These having been published, had at once the effect of establishing the corn-trade of that district on a proper footing. Were the same remedy applied to the cure of the evil that now exists in the cattle-trade, and nothing surely can be more simple, consequences equally beneficial would ensue. Proprietors would be more certain of receiving their rents; and the peace, comfort, and well-being, of many an honest industrious farmer's family, remain undisturbed.

Although horses are now chiefly employed, yet it is evident, that in former times, the operation of ploughing was performed in almost every part of these kingdoms with oxen. In regard to the propriety of this so general a change, or the advantages of the one practice over the other, the writer means to offer no decisive opinion. The subject appears to him to be exhausted. Every modern writer on husbandry, has had it under consideration; and, besides using every argument that ingenuity could devise, in order to evince that oxen are in every respect superior to horses, many of them have also published hypothetical tables to prove that their reasoning was well founded. On the other hand, a few individuals only, in the class of practical farmers, have assented to the justice of the reasons assigned, or to the correctness of the calculations exhibited, in so far as to have adopted the alteration proposed. Whether it be



owing to the circumstance of the demand for fattening cattle having increased to such a degree, that the supply that can by any means be furnished, is insufficient; or, that horses, by their spirit and activity, possess a real superiority over cattle, in draught; or whether owing to a combination of these with other circumstances; certain it is, that the number of cattle employed in the plough is every year decreasing, while that of horses is rapidly increasing.

# SEC.

Every modern writer on husbandry, has had it under consideration; and besides using every argument that ingenuity could devise, in order to evince that oxen are in every respect superior to horses, many of them have published hypothetical tables to prove that their reasoning was well founded. On the other hand, a few individuals only, in the class of practical farmers, have assented to the justice of the reasons assigned, or to the correctness of the calculations exhibited, in so far as to have admitted the allocation proposed. Whether it be owing

## SECTION III.

*Sheep.*

WE are now to enter on a subject of the greatest national importance, the breeding, rearing, and managing of sheep. "Sheep," say the Swedes, "have golden feet, and wherever they set them, the earth becomes gold."—A strong figurative expression, by which they denote the high esteem in which they hold this animal. The proper management of sheep, whether the prosperity of agriculture, the advancement of manufactures, or the supply of provision for the inhabitants, be singly considered, will be agreed by all, to be a most interesting particular in rural economy; when these are regarded in conjunction, there is no other of the domesticated animals, whence mankind derive so much benefit. Their flesh, wool, suet, milk, skin, dung; in a word, almost every part of them is applied to useful and profitable purposes. In an agricultural view, the benefit derived from folding sheep on turnip lands and other light soils, is highly rated in many parts of England. Mutton is universally and justly esteemed as a most valuable

valuable article of provision. With respect to manufactures, it is well known, that wool is the staple commodity of these kingdoms; it furnishes employment for a very large portion of the inhabitants at home; is the means of extending our commerce abroad; and on the whole, forms a greater source of riches to the nation, than any other article of which it is possessed.

This valuable animal possesses a remarkably quiet inoffensive disposition, and is at the same time the most defenceless of all others. Sheep are easily frightened, and are peculiarly fond of society; few instances occurring, except among the mountain-breed, which is more inclined to rove and stray, where a sheep in good health is found separated at any considerable distance from the flock.

There is no country in Europe, perhaps in the world, that is, upon the whole, better adapted to sheep-husbandry than Great Britain, particularly the southern and more fertile parts of the island. There, an almost perpetual verdure appears. The frosts and snows and severities of winter, are of short continuance; while in summer the air is temperate, and rich and nutritive pastures everywhere abound. No wolves, tigers, nor other ravenous beasts, disturb the flocks; nor do those insects and reptiles so common in warm climates, prove in this, in any material degree, injurious to these defenceless animals.

All



All the various sorts of sheep in Europe, according to M. de Buffon, are of the same species, although, as may be observed in the flocks in Great Britain, very greatly diversified. Dr Campbell is of opinion, that sheep were first imported into this island from Spain. "It cannot be doubted," he says, "that as the inhabitants of Britain and Ireland, so the sheep also, came originally hither from some other country, and most probably, for many reasons that might be assigned, from Spain." This seems confirmed by the breed being the same in both islands, and having a great resemblance to the Spanish sheep.

From whatever quarter sheep were first brought into Britain, certain it is, that in ancient times wool was in great abundance, and not only the chief article of foreign commerce, but also the means by which domestic traffic was carried on. The same author, Dr Campbell, in the account he gives of sheep and wool in former times, (Vol. II. p. 132.) remarks, that "the wealth of the nobility, gentry and monasteries, consisted chiefly in wool, which also then made the bulk of private property at home. It was, at the same time, the prime article in commerce. Aids to the Crown were granted therein. It supplied the demands for the support of armies, the payment of subsidies, and all other expences

\* Campbell's Political Survey of Great Britain, Vol. ii. p. 160.

"expences incurred on account of the public  
"in foreign parts."

Wool having been an article of so great consequence, even in the infant state of manufactures and commerce in England, was probably the reason that induced Edward IV. to apply to the then King of Castile, for some of the Spanish breed of sheep, which had about that time been much improved by rups brought from Barbary. This request having been complied with, and these rups having been coupled with the best ewes of the country, of original breed, produced a race greatly superior, both in carcase and wool, to the native sort. By this means was laid the foundation of that improvement in the quality of the wool, and the shape of the animal, which was afterwards, by the care and attention of succeeding Sovereigns, to a considerable degree effected.

In Queen Elizabeth's time, the attention of Government seems to have been directed to the same great national object. Many very proper regulations were made, and men of respectability and judgment specially appointed to superintend this important branch of husbandry. Shepherds were not only regularly instructed in the art of managing flocks of sheep, but were also furnished with written directions. Many other laudable means were also used to give effect

fect to the measures which the executive government suggested as necessary to be adopted.

By importing, from time to time, the best breeds of Spain, and by adhering steadily to the rules and regulations above alluded to, considerable improvements were no doubt effected; but to what extent cannot now be ascertained. The succeeding Sovereigns having slackened in their attention, the breeds of sheep, and the quality of the wool, became gradually debased, and as this was the case for a long period, it is easy to account for the degenerate state to which the British wool had arrived, and for the loud and reiterated complaints made by the manufacturers of the present age. Their complaints induced many sensible people to write on the subject; but their suggestions were in general little attended to. Fortunately for Great Britain, it possessed one individual at least, (the late Mr Bakewell), who, duly weighing the magnitude and importance of the object, devoted a long life to its attainment. How far he was successful in his endeavours shall be taken notice of in the sequel. Suffice it, for the present, to say, that to him, and to him alone, it is owing that so general a spirit for improving the breed of sheep now exists: A spirit so great, that if it be not checked by some unforeseen disastrous event, must necessarily be the means of raising this animal in usefulness and value to the farmer, the manufacturer,



facturer, and the consumer, beyond what it ever was at any former period.

The different breeds, or rather varieties, of sheep in Great Britain, may be ranged into three general divisions, beginning with that, which, as being the most ancient, rather than for its superior excellence, claims the first place, namely,

**The Mountain Breed ;**

**The Short-woolled Breed ;**

**and,**

**The Long-woolled Breed.**

THE mountain-sheep consist of several varieties ; as, The black-faced, which range on the mountains of Wales, Westmoreland, Cumberland, Yorkshire, and on those in the south, west, and north of Scotland : The Cheviot breed, which is chiefly confined to the hills of that name, in the north of England, and south of Scotland : The forest sheep, that pasture on the forests and commons in the former kingdom : The Danish breed, which is to be found along the bottom of the Grampian mountains, adjoining to the better cultivated parts of the low country, and in some parts of the north of Scotland : and, lastly, The Shetland breed. The particulars in which these differ from each other, may be ascertained by reviewing the agricultural descriptions of the counties of Peebles, Roxburgh, Warwick, Elgin, and Orkney.

The

The short-woolled sheep, besides those of Shetland and the Cheviot-hills, are chiefly to be found in the counties of Hereford, Dorset, Suffex, Norfolk, and some parts of Cumberland, and are particularly taken notice of in the account already given of the live-stock in these respective districts.

The only other distinct variety, that is the long-woolled sheep, are spread over all the most fertile parts of England. They, are, however, distinguished by the names of the Durham or Teeswater, the Lincolnshire, and the old and new Leicestershire; and the reader has only to refer to the preceding description of these respective counties for the particulars in which these breeds differ from each other. In order further to assist him to form a correct idea as to the comparative merits and value of all these various breeds, a Synopsis, or General View, of the different Breeds of Sheep in Great Britain, borrowed, by permission, from Mr Culley's valuable Treatise on Live-stock, is here annexed.

Vol. III.

Z

A

# A SYNOPSIS,

OF GENERAL VIEW, of the different BREEDS of SHEEP in Great Britain. Taken, by Permission, from Mr. CULLEY's Treatise on Live-Stock.

# THE PRESENT STATE OF

|                | Average<br>weight of<br>fleeces<br>per lb. | Price of<br>wool<br>per lb. | Average<br>weight of<br>wethers per<br>quarter. | Year sold<br>when<br>killed. |
|----------------|--------------------------------------------|-----------------------------|-------------------------------------------------|------------------------------|
| Dudley         | 8                                          | 7.                          | 25                                              | 2                            |
| Lincholnshire  | 11                                         | 0 10                        | 25                                              | 3                            |
| Tees-Waters    | 9                                          | 0 10                        | 30                                              | 2                            |
| Darvmore Natts | 6                                          | 0 8                         | 30                                              | 2½                           |
| Esmoor         | 9                                          | 0 8                         | 16                                              | 2½                           |
| Herdshire      | 3½                                         | 1 2                         | 18                                              | 3½                           |
| Heredorshire   | 2                                          | 2 9                         | 14                                              | 4½                           |
| South-Down     | 2½                                         | 2 0                         | 18                                              | 2                            |
| Norfolk        | 2                                          | 1 5                         | 18                                              | 3½                           |
| Kleath         | 2½                                         | 0 6                         | 15                                              | 4½                           |
| Herdwick       | 2                                          | 0 6                         | 15                                              | 4½                           |
| Cheviot        | 3                                          | 0 11                        | 10                                              | 4½                           |
| Dunfaced       | 1½                                         | 3 0                         | 7                                               | 4½                           |
| Sherland       | 1¼                                         | 3 0                         | 8                                               | 4½                           |
| Danilo Breed   | 1½                                         | 0 10                        | 8                                               | 4½                           |



To have entered again on a minute detail of the particulars in which these various sorts of sheep differ from each other, would have been contrary to the plan of this work \*; it being rather proposed to convey information, in regard to the general mode of managing flocks of sheep, and to point out the great advantages that the inhabitants of these kingdoms at large must derive from the improvement of this valuable species of live stock: On the other hand, to pass over this part of the subject altogether in this place, might by many be deemed improper. The writer, therefore, anxious to avoid the two extremes, shall adopt a middle course; and having had the most ample opportunities, however indifferently he may have improved them, of ascertaining the comparative properties of two varieties of the long-woolled sheep, viz. those in the county of Northampton, which may be called the Lincolnshire, and the Bakewell, Dishley, or new Leicester breed, the result of that investigation, as detailed in his Report of the State of Agriculture

\* Had it been consistent with the arrangement the writer had adopted, he is sensible, that when compared with the Treatise above mentioned, it would have been extremely imperfect. Mr Colley's superior knowledge in that line, his long and extensive practice, and his general acquaintance, rendered him peculiarly well qualified for such a task.

ture in the former county, is here subjoined, and whence every reader may draw his own conclusions.

About twenty-five years ago, an improvement was attempted, by crossing the ancient breed with tups from Warwickshire and Lincolnshire; the breed of Warwickshire being noted for great bone or size, and that of Lincolnshire for the quantity of wool.

With the success of this experiment the farmers seemed perfectly satisfied; as a general opinion prevailed, that the animal would feed in exact proportion to the size of the bone, and that an additional quantity of wool might be produced, without any detriment to the carcase. This practice, therefore, went on for many years. The new breed improved greatly in size; and the farmers gave themselves no trouble to ascertain, whether the increase in size and weight could be accounted really beneficial or not.

So fixed and rivetted were they in the opinion of the good choice they had made, that it was not without much difficulty they could be persuaded of the possibility of introducing any additional improvement. This, however, has of late years been effected; and the new Leicester or Dishley breed, (which form a complete contrast to the former), are pretty generally introduced, owing principally to the fol-

lowing circumstance. Mr Bakewell, whose name stands unrivalled in that line, about the year 1788, instituted a society, consisting of himself and fifteen or sixteen other respectable farmers in Leicestershire, and the other counties.

This Society had for its object the improvement of the different breeds of live stock, particularly of sheep : And by almost every account they seem to have succeeded beyond their most sanguine expectations.

To follow them through all the experiments which they have individually made, or to detail the proofs which they are ready to produce in regard to the difference of bone, offal, wool, &c. in order to ascertain the advantages which the new Leicestershire breed possesses over every other, would be an endless task. And though these experiments seem to have been fairly and candidly made; yet, as none have been attempted, in order to prove the superiority of any other breed over this, it appears a matter of more general importance to state fully, in what respects this breed is said, by those more immediately interested, to excel all others, and then leave it to the impartial public to determine whether they have succeeded, and to what extent.

1<sup>st</sup>, It is said, that this breed will, on a given quantity and quality of food, produce a greater profit to the farmer than any other.

2<sup>dly</sup>,



2<sup>dly</sup>, That they are extremely handsome or well made, and therefore more disposed to fatten.

3<sup>dly</sup>, That they carry more flesh and fat on the same weight or size of bone.

4<sup>th</sup>, That they will thrive on such pasture as other flocks, of similar size, would fall off upon.

5<sup>th</sup>, That an acre of land will maintain or fatten a greater number of them, than of any other breed which bear the same proportion in size of carcase.

6<sup>th</sup>, That though the quantity of wool is about one-fifth less than that of the old Northamptonshire breed, yet the value by the pound is about one-tenth more; and that, for the reason last mentioned, both the quantity and quality of the wool, if the return be calculated by the acre, must be in favour of this breed.

7<sup>th</sup>, That this breed are ready for market in April or May, whereas the others cannot be offered to sale before September or October; and that therefore not only a greater number can be kept on an acre, as above mentioned, but a summer's grass is saved in the one case, which is consumed in the other.

8<sup>th</sup>, That the mutton of this breed, in consequence of the closeness of its texture, will keep  
several

several hours longer in warm weather, than that of any other of the same size.

These are the most valuable properties which this sort of sheep is said to possess over all others; and if they really do possess them, it is not to be wondered at, that their superiority should be so strenuously maintained.

On the other hand, it is asserted by many, that all the boasted superiority consists more in the high prices at which the members of the Society dispose of their tups, than in any real improvement in the shape or constitution of the animal; and therefore they affirm, that this superiority must fall to the ground, as the breed comes to be more generally introduced.

It is perfectly clear, that high prices given for any species of breeding stock certainly does not, *in every instance*, prove the intrinsic value or superiority of the breed; and therefore, if the new Leicester sheep have nothing else to recommend them, they will not long keep up to their present character; but those who seem anxious to depreciate this breed, ought to come forward with something more likely to carry conviction to the mind, than bare unsupported assertions, which they cannot expect will meet with much credit.

The particulars above stated, in which this breed are said to excel all others, (and which have

have been inserted here, in order to bring the question fairly to issue), may be proved true or false by every intelligent farmer in the neighbourhood; but as no attempt of this kind has hitherto been made, it is but fair at present to suppose, that the superiority really remains unquestionable. The writer of this Report pretends to no particular knowledge in regard to the different breeds of sheep, and is one of those who would be ready to suppose, that the size alone is what stamps additional value on either a sheep or a bullock; hence, what is here stated, is the substance of what he learned in the course of his survey, rather than his own private sentiments. It is, however, the general opinion over the kingdom at large, whether it be well or ill founded, that the new Leicester breed of sheep is superior to every other. Though it is not intended to state, that it has attained the highest possible degree of perfection, to which it is practicable to bring the species,—a point which, it is presumed, the Members of the Society, deeply interested as they are, will not maintain; yet, in place of withholding that degree of praise to which this Society seems so justly entitled, it would be fortunate for the community at large, if some men, equally knowing and attentive, would endeavour to prove the possibility of improving this species of live stock to a still higher degree of perfection; in the prosecution of which



which attempt, every wellwisher to his country will be anxious for their success.

It may be added, that one great objection to the new Leicestershire sheep is, *their disposition to fatten to an extraordinary degree* \*; and that they are not so *delicate eating* as those sheep which require longer time to be ready for the market. It is believed, that the warmest advocates for this sort of sheep will not hesitate to allow their disposition to fatten, though they may dispute the other point, which depends in a great degree on the taste of the consumer; but, if it is certain that a quarter of this mutton, weighing upwards of 30 lb. will only have 2 lb. weight of bone, while a quarter of the *old improved Northamptonshire breed* of the same weight, will have about 5 lb. the improvement of the breed is at once determined, so far as the opinion of the *great body* of the consumers can go;

\* This is a fact in which all are agreed; and although mutton with three or four inches of fat on the ribs may not be agreeable to the nice taste of some individuals, yet it seems to suit the palates of the great body of the consumers. Besides, it should be observed, that the fat, which at the desire of some customers is cut off, is as valuable to the butcher as any other part of the animal. What he does not sell as suet for puddings, the use to which it is commonly applied, he can at all times dispose of to the tallow-chandler, and for a valuable consideration.

go; as a mechanic or labourer, who has a large family to support by his earnings, if sensible of the fact, will be ready to agree with the new Leicester Society, that an improvement has really been effected, at least to the extent of the value of 3 lb. of meat in a quarter of mutton, compared with that of an equal weight of bone.

The above properties of the new Leicester breed of sheep, may be reckoned, in so far, sure criterions by which farmers may determine the circumstances necessary to be attended to in breeding live-stock, particularly sheep. A handsome form; a disposition to fatten quickly, and at an early age; bone small; little offal; the superior quality, and, when rated by the acre, the additional quantity of wool; and becoming fat, with a less portion of aliment than is necessary for keeping other sorts of sheep in ordinary condition; are particulars worthy the consideration of stock breeders, and to which the experienced in that line pay due attention.

When a farmer adopts the resolution of endeavouring to improve his stock of sheep, either in regard to the symmetry of the carcase, or the quality of the wool, he ought to consider, in the first place, the situation and circumstances of his farm, and the particulars in which his ewes are deficient; and then, hire or purchase tups of that breed, which, while they are not too delicate

licate or too large for his pastures, possess in the greatest degree, those points in which his own are deficient. If he thus act, and afterwards select the best individuals that are produced from this cross, for the purpose of breeding from, he is much more likely to attain his object, than if he go on coupling his ewes with a variety of tups, each possessing, perhaps in a great degree, some one of the good properties of which he is desirous his stock should be possessed. This, it is believed, was the method practised by Mr Bakewell; and if those who tread in the same path are to any considerable degree as successful, they will not have reason to repent the requisite expence or attention.

Great caution ought at the same time to be used by all stock farmers, not to introduce a larger or more delicate breed, however valuable, than the nature of the soil and climate will properly admit. Suiting the stock to the situation of the farm, in these respects, is one of the most important points that merits the farmer's consideration, and has proved a greater bar to the general improvement of live-stock than many people imagine. To attempt to introduce the great black cart-horse of England into the mountainous districts of Wales, or the large short-horned breed of cattle into Shetland or Orkney, would be an act of impropriety, that would in due time meet its reward,—disappointment. To  
introduce



introduce the Bakewell, or other vale breeds of sheep, into cold bleak sterile situations, would in all probability be an attempt equally hazardous. There are evidently two great distinguishing features in the character of the sheep of this island; those common in the champaign country, being a heavy, slow moving, tame, and rather inactive animal, are peculiarly well adapted for a country rich in pastures, and properly inclosed; while the mountain breed, having a light carcase, an active disposition, and a constitution much more hardy than the other, are better adapted to undergo the fatigue of searching for food. Another description of sheep, forming a kind of medium between the two above mentioned, are also very common in England, and occupy what may be called the gentle eminences of the country, as the Suffex Downs, the Wiltshire Downs, &c. This sort is much more agile, and better formed for walking, than the vale sheep, while they are less wild and untractable than the mountain breed, to which, however, they seem more nearly allied than to the other.

Before describing the modes usually adopted for managing these different sorts of sheep, a perusal of Mr Culley's description of a tup cannot fail to be agreeable to the reader. "The head  
" of a tup," this eminent breeder says, "should  
" be fine and small; his nostrils wide and ex-  
" panded;

“panded; his eyes prominent, and rather bold  
“or daring; ears thin; his collar full, from his  
“breast and shoulders, but tapering all the way  
“to where the head and neck join, which should  
“be very fine and graceful, being perfectly free  
“from any coarse leather hanging down; the  
“shoulders broad and full, which must at the  
“same time join so easy to the collar forward,  
“and cline backward, as to leave not the least  
“hollow in either place; the mutton upon his  
“arm, or fore-thigh, must come quite to the  
“knee; his legs upright, with a clean fine bone,  
“being equally clear from superfluous skin, and  
“coarse hairy wool, from the knee and hough  
“downwards; the breast broad and well for-  
“ward, which will keep his fore-legs at a proper  
“wideness; his girth, or chest, full and deep,  
“and, instead of a hollow behind the shoulders,  
“that part by some called the fore-flank, should  
“be quite full; the back and loins broad, flat,  
“and straight, from which the ribs must rise  
“with a fine circular arch; his belly straight;  
“the quarters long and full, with the mutton  
“quite down to the hough, which should nei-  
“ther stand in nor out; his twist, (the junction  
“of the inside of the thighs), deep, wide, and  
“full, which, with the broad breast, will keep  
“his four legs open and upright; the whole  
“body covered with a thin pelt, and that with  
“fine, bright, soft wool.”

The

The rules for selecting breeding ewes from the flock, have already been mentioned; namely, to take only such as possess, in an eminent degree, those properties which are deemed essential in that particular variety. Ewes are allowed to copulate at the age of eighteen months; that is, about Michaelmas twelvemonths after they are lambed. They go five months with young; and, except where house-lambs is the object, the usual lambing season is March or April.

The management of the mountain breed of sheep being extremely different in different parts of the island, renders it necessary to divide the subject under two heads, *viz.* the usual method adopted on the Cheviot, and the adjoining hills, and that common in the other parts of the country.

The sheep farmers on the borders of the two kingdoms divide their stock into different parcels; as lambs, year olds, two year olds, and old sheep. These are kept distinct from each other; each parcel being placed under the care of a separate shepherd. The old sheep (wethers and two year olds) occupy the more elevated pastures. The breeding flock, and the young sheep, those that are more fertile, and better sheltered. Owing to the attention bestowed by the store-farmers in these districts, in providing winter food for their stock, as turnips, hay, &c. added to the superiority of the summer pasture, which is mostly green-sward, and that the best  
of



of the females only are bred from, the Cheviot breed have been greatly improved; and, from the exertions now making by the sheep-farmers in that country and neighbourhood, there is every reason to hope still greater improvements will in a short time be effected. The wethers are commonly sold at the age of four and a half; but the practice of disposing of them a year sooner is more and more gaining ground. Could their disposition to fatten at an early age be added to the other good properties they are known to possess, it would be a source of much profit to the farmers, and the public would be greatly benefited.

The generally prevailing mode of managing the mountain-sheep, in the other parts of Great Britain, is conducted on principles whence neither profit nor improvement can ensue: Every ewe in the flock is put on a footing; and the ugliest and worst-shaped, are by the owner considered as equally fit for breeding as the most handsome, in case the ram be of an approved form. No selection is made in the propagation of the species; nature is allowed to act without control: Hence the degeneracy so apparent in the offspring; and hence too the prevailing complaint in many places, that the former breeds, which were celebrated for some peculiar properties, are said to be lost. Although this is the general management, yet it does not apply in

in every case : There are numerous instances, where the store-farmers, as they are often denominated, shew laudable attention, and have in consequence proceeded considerable lengths in improving their flocks.

During summer, the flocks are allowed to range at large over the hills and commons, often without any person to attend or watch over them. Towards the end of summer, or rather on the approach of winter, they are collected and brought home, in order to undergo the operation of salving\*. The old sheep are again turned out on the mountains ; and, where the farm affords that convenience, the hogs or young sheep are wintered on inclosed pastures, adjoining to the farm-houses ; otherwise, they share the fate of the others. In some districts, the whole flock is kept on the pastures, whether open or inclosed, adjoining to the farm-houses. These are called the home-grounds ; and are intentionally saved during summer for the purpose. When the weather becomes severe, they have

\* This is a practice adopted, with a view of preserving the sheep from sustaining any injury from that inclemency of weather, to which they are exposed in these elevated and stormy situations, during the winter months. The salve, which is composed of butter and tar, in proportions according to the exposed situation of the pastures, is carefully rubbed over the fleeces. The operation is performed usually in the month of November.

have a daily allowance of hay or straw; and where the home grounds are not sufficient for the stock, pastures in other parts of the country, more favourably situated, are usually rented. One or other of these methods is generally adopted in the north of England, and the south of Scotland. In the northern districts of the island, where, from the greater severity of the weather, more attention is requisite, less is bestowed.

The flocks are in common permitted to shift for themselves, even in the most intemperate seasons, and when the face of the country is covered to a great depth with snow. Instinct, however, directs these poor neglected animals to use the only means which, under such circumstances, could be effectual for procuring food. They scrape off the snow with their feet, so as to get down to the heath or withered herbage; an operation which they perform with a surprising dexterity and despatch. In very tempestuous weather, indeed, especially when accompanied with falls of snow, the store-master and his attendants deem it requisite to resort to the usual haunts of the flocks; and by driving them about, and keeping them in motion, to prevent them from being blown up, under mountains of snow; a catastrophe, however, which all their exertion is not on many occasions able to prevent.



vent, although frequently attempted at the imminent hazard of their lives.

Sheep-husbandry having of late been very generally established in many of the northern districts of Scotland, where cattle were formerly bred, has been the means of creating an unexampled demand for lambs and young store-sheep from the more southern hills. This has had the effect not only of greatly advancing the price, but also of enhancing the value of the store-farms in the last-mentioned part of the kingdom.

Whether this alteration of system may ultimately prove a benefit or a misfortune, time and experience only can determine. At present, the latter appears more to be dreaded, on sound principles, than the former, to be expected. The depopulation of the country, which, every candid person must allow, ought to be ranked in the class of misfortunes, rather than in that of advantages, is the first consequence, and cannot fail in time to be severely felt \*. The south country proprietors and sheep-farmers are no doubt,

\* The feelings of those gentlemen, who have been most zealous in this *laudable undertaking*, of depopulating their estates, must be very different from those which their ancestors possessed. They, with the attention of parents, watched over the interest, and, to the utmost of their power, promoted the happiness, of every individual of the clan. What a contrast does the conduct

doubt, for the present, deriving benefit from this change of system, by so many sheep being annually purchased for the purpose above mentioned: but when these hills shall be completely stocked; when the tide shall begin to turn, and numerous flocks be annually driven southward to a market, which in a country without commerce, without manufactures, nay, almost without inhabitants, that can afford to use mutton as an article of food, must necessarily be the case,—it must have such an effect on the price of sheep in the great markets in the north of England, as will in a few years deprive them of all their former gains.

In regard to those new adventurers, whether, besides other disadvantages they labour under, they have fully calculated the expence and risk consequent on sending a low-priced animal perhaps three hundred miles to a market, that is, from the counties of Ross, Sutherland, or Caithness, to Cumberland, Westmoreland, &c. is a matter

conduct of the present proprietors form! We behold them scattering over the face of the earth, with the most unrelenting severity, the descendants of those very people, whom their forefathers cherished with so much care. Yet view the conduct of these men, in the Senate of the nation, or in public assemblies, and hear them descant on liberty, property, the rights of man, and other such topics; and one would be almost persuaded,—that they were patriots,—lovers of their country,—friends of mankind.

matter in which they are more immediately interested than the public.

Previous to the late great extension of mountain-sheep husbandry, lambs, or young stock, were seldom fold by the store-farmers. The usual practice was to sell the wethers to butchers or graziers in autumn, when three and a half, or four and a half years old. The old ewes were also fold in the end of the year to graziers, who, after wintering them on more sheltered commons, or on inclosed pastures, fattened them, together with their lambs, in the course of the following summer.

There is little difference in the management of the short-woolled sheep in the different counties of England where they prevail. The practice of folding, if not universal, is at least very general. The sheep are folded all the year round; in summer and autumn, for the most part, on fallow, and other lands in the course of preparation for wheat; during winter, sometimes on the stubble-fields, but most frequently on the downs or pastures; and in spring, on the lands intended for barley. As the folds are placed on the tillage-lands the greatest part of the year, the chief pastures lie consequently at a considerable distance from the folds; on which account, the light active short-woolled sheep have been found, from experience, greatly preferable to any of the vale breeds that have hitherto been tried.

The



The chief object the farmers in the down districts had in view by keeping flocks of sheep, was, till of late years, manuring their tillage lands. They have, however, now discovered, that, by bestowing more attention than they formerly did, the quantity of manure may be increased, while the animals themselves may be rendered more valuable. The degree of emulation that has lately taken place among the owners of the short-woolled sheep, and the exertions they are using for the improvement of their flocks, is only exceeded, on the one hand, by the spirited endeavours of Mr Bakewell's disciples, to retain that superiority which they suppose their flocks have attained; and, on the other, by the unremitting assiduity of those who are possessed of other breeds of long-woolled sheep, to get so far forward as to be able to contend with the new Leicestershire breeders for the palm of victory.

The possessors of the short-woolled breeds of sheep have, of late, evinced as much care and discernment in the selection of the breeding part of their stock, as in the general management. The tups and ewes most remarkable for the fineness of their fleeces, and the form of their carcases, are set apart for the purpose; and introducing crosses from other flocks is a practice also frequently followed, when there is

is reason to believe it will be attended with success.

In the summer season, or rather, from the beginning or middle of April till the end of October, the downs supply ample store of food, which, although short, is very sweet and nourishing. When the season is so far advanced that other sorts of provender become requisite, the sheep are folded on turnip or cole; and they continue on these sorts of food during the winter, and some of the spring months. When these crops are exhausted, some hay is usually stacked on the downs, on which the flock is chiefly fed till the return of the grass season. The wethers are sometimes sold to the grazier at two, but more frequently not till they be three years old: When the farm affords proper convenience for fattening them, they are sold directly to the butcher, and commonly when about two years and a half. The ewes are seldom kept after they are five, or at most five years and a half old. The management of the long-woolled, or what has been denominated, the vale breeds, in contradistinction to the other two sorts already noticed, is, with few exceptions, such as must meet general approbation, and such also as, from the circumstance of the breeder's being in most cases the grazier, must necessarily prove the most advantageous. In knowledge and attention to what may be called the breeding branch

branch of sheep-husbandry, the farmers in the more fertile parts of England, where the long-woolled sheep are chiefly to be found, greatly exceed all others; and, in the expenditure of money on the improvement of their stock, their liberality is more unbounded than that of any other description of farmers in Europe. When it is stated, that from twenty or thirty, to two or three hundred pounds, are frequently paid for the use of a tup for a season, the reader will take it for granted, that the choicest ewes of the flock are carefully selected for the purpose of breeding. Much might be said on the subject of hiring tups, and of the rules and regulations adopted by those who are in possession of the best flocks. The conduct of the tup-breeders has been censured, with great severity, in some of the county Reports; but, notwithstanding the sarcasms that have been thrown out against them, some of which could have been the productions only of an illiberal mind, the writer may venture to predict, that if the practice of hiring tups, at such prices, continues to spread with the same rapidity it has done for some years, and of which he does not entertain a doubt, the improvement of this species of stock will soon arrive at a degree of excellence unexampled in any former period.

In respect to the general management: The lambs are weaned in the latter end of June, or beginning



beginning of July, and put into an inclosed pasture, where they continue till the end of the grass season, and are usually put to turnips in the month of November following. On the return of the grass season, the wether hogs, being separated from the young ewes, are put on clover, or other good pasture, where they continue, till the approach of winter renders it necessary to put them again on turnips. In the spring of the second year they are again put on clover, on the earliest pastures, and are disposed of to the butchers in the following May or June; that is, when little more than two years old. After the young ewes, or year-old female hogs, are taken off the turnip-field, they are put on inferior pasture during summer, and form part of the breeding-stock, as they are allowed to take the tup when about eighteen months old. The breeding stock are usually kept on turnips, or other green food, during winter, and on the middling pastures of the farm during summer. The ewes are in general draughted off from the flock when three or four years old, and fattened for the butcher. The tup lambs are selected with great attention, and reared with much care.

The ewe lambs that are defective in any of those points which a skillful breeder thinks essential, are never mixed with the breeding stock; they are commonly sold to the butcher when  
lambs,

lambs, or if not, kept in pastures separate from the tups. In a word, the general management is not only well calculated for producing valuable stock, but also to render it in every respect the most profitable. It will appear obvious, that the season for sheering sheep must vary, according to the climate of different districts; summer commencing sooner in some than in others. That being the case, the best way, a writer on the subject observes, is to be directed by the weather, so that the sheep may neither suffer by the cold, when stripped of their wool, nor be injured through too great heat, by being made to wear it too long.

The wethers have considerably more wool than the ewes. In the fleeces of either there are several qualities; some reckon eight or nine different sorts. These are all separated from each other in England by a set of men, called wool-stapplers, who are appointed for the purpose, and who are sworn to do justice between the grower and the merchant or manufacturer. It is surprising that the British Wool Society, a Society established for the express purpose of endeavouring to improve the quality of wool, particularly that of Scotland, has not got this useful regulation extended to that kingdom; more especially as there is not a member of the Society but must know, that the Scotch wool is in general sent to be stappled in Yorkshire.

The age of sheep, like that of cattle, is discernible by their teeth; they are denominated one shear, two shear, &c. according to the number of fleeces that have been shorn. A sheep of one shear, or of one year old, has two broad teeth before; a two shear sheep has four; a three shear six; and a four shear, when it is said to be full mouthed, eight. After four, the teeth begin to break and shorten.

The business of a shepherd is very important, as on his due care and unwearied attention depend in a very great degree the welfare and value of the stock, and consequently the profit of the owner. The business of a shepherd is to superintend the flock at all times, and more particularly at the lambing season; to take care that no improper tup intrude at the season of copulating; to determine the proper time for shearing or clipping the fleece; to draw out such sheep as are in condition for the grazier or the butcher; and such also, as from age or deformity, are improper to be kept longer in the flock. He ought also to have a competent knowledge of the diseases of sheep; of the proper remedies to be applied, and of the modes of application. In short, he ought to be diligent and attentive; a competent judge of the good properties which the particular breed of sheep, of which he is to have charge, ought to be possessed; and he should also, especially where the breeder



breeder is the grazier, be able to determine, with precision, what part of the flock is and what is not in condition for the butcher.

Although little attention has been bestowed, but at some few particular periods, to improve the breed of sheep, either in regard to form, size, or quality of wool; yet, in all ages and countries, it seems to have been deemed a matter of the greatest importance to keep up, or rather to increase this species of stock, in point of numbers.

The improvement of the various sorts of sheep in this country, may be said, in general, to be yet in its infancy. In some districts, greater progress has been made than in others; while in not a few they remain, according to the Cumbrian's expression formerly quoted, "Sik as God sent!" Whether the man of observation and reflection considers the spirit for improving the breeds of this valuable animal, that at this time prevails in many parts of these kingdoms, especially in England, in an agricultural, a manufacturing, or a great national view, he must, if he wish the prosperity of his country, feel the most pleasant sensations arise in his mind, from the certainty, that the labours of so great a number of the most respectable farmers in the island will, if persevered in, be sooner or later crowned with success: He will, at the same time, regret,

gret, that so many of the farmers, along the western and northern coasts in particular, remain in an inactive state ; that hitherto few of them have adopted the resolution of setting out on this sure road to the attainment of individual wealth, and national prosperity.

It was already stated, that some breeds of sheep were better for particular situations than for others. Mr Marshall somewhere observes, that " every soil has its own stock ;" an observation which must be consonant to the ideas of every man who is in any degree acquainted with stock-husbandry. But although, as in proportion to the goodness of the pasture, and the temperature of the climate, so ought to be the nature and constitution of the animal ; yet no person will chuse to maintain, that any of the general breeds above mentioned are either so good or so bad that they cannot be improved. Hence it is equally an object of importance to sheep-farmers, of every description, to devote their attention to the improvement of their stock. To the proprietors and farmers in the mountainous parts of the country, it is even more so than to those who reside in the level and fertile districts : Neither the carcase of the animal nor its fleece can, it is true, ever become so valuable as those of the low country breeds ; but they may both to a certainty be improved in a comparative degree. Those people ought at the same time

to

to keep in mind a circumstance that appears to merit their serious attention, namely, that it is by improving the native breeds of sheep chiefly, that the rugged and less productive parts of the country can be occupied to the greatest advantage; while they must be satisfied, that the rich pastures, where the long-woolled sheep are most prevalent, may be converted into tillage at pleasure.

It was hinted in a former part of this Section, that the British nation is indebted to the very uncommon exertion, steady perseverance, and superior knowledge, of the late Mr Bakewell, as a stock-farmer, for setting afloat that spirit for improving the breeds of the different species of live-stock, which, fortunately, now so conspicuously and so generally displays itself in the southern parts of the island: That *plain honest man*, for in these three words his character may be summed up, was early bred to husbandry, and for the last forty years of his life, devoted his attention chiefly to the improvement of the different species of live-stock, and with such a degree of success as raised him to a greater height, in general estimation, than any other practical British farmer in this or any former age ever attained.

The improvement of the breeds of sheep was his first, and always his favourite object. This was no doubt the consequence of his reflecting,  
that



that the improvement of no other sort of live-stock would tend so materially to promote the joint interests of agriculture, manufactures, and commerce.

When Mr Bakewell entered on the active management of the farm of Dishley, about the year 1760, the breed of sheep in that and in every other part of England, was considered as meriting no attention; improving the quality of the wool was in no instance attempted; great sized, large boned, coarse looking animals, were prevalent in all the better pastures of the kingdom. This discerning man, after repeated examinations of the different breeds then common, discovered, that one sort possessed properties peculiar to themselves, while some again were remarkable for others materially different, although not less essential in the form of what he considered the most valuable breed of sheep, *viz.* in the form of that animal, which on a given quantity and quality of food, would yield the greatest profit to the breeder and the grazier, and at the same time be most useful to the consumer. Being satisfied, that with due care in the selection, and by bestowing proper attention afterwards to the breeding-stock, the good properties of various breeds might be united in one, he set about the arduous and important undertaking. In the course of excursions into various parts of England, he selected such tups and

and ewes as were most proper for his purpose, and began a course of experimental sheep-husbandry, on a larger scale, and pursued it for a longer period, than any other individual in this, and probably in any nation, ever did. The success which attended his uncommon exertions is well known. Soon after he commenced his experimental course of sheep-husbandry, he began to hire out or let his tups for a season; for some he received fifteen shillings, for others a guinea. As the merit of this new breed became known in the neighbourhood, the price of his tups advanced; ten, fifteen and twenty guineas, were given for some of the best. The fame of this breed diverging into more distant districts, and the superiority which it possessed over every other becoming the general subject of conversation, and of investigation, among all ranks and degrees of stock-farmers, and terminating always in favours of the Dishley breed, were the means of raising its character in the process of time to such a height, that a few only, and these self-interested persons, venture now to dispute its being superior to every other. It was formerly mentioned, that high prices given for any species of breeding stock does not, in every instance, prove the intrinsic value or superiority of the breed. A person ignorant of the properties which a good tup ought to possess, may give a hundred guineas for the use of one, for

for which a real judge would not give ten. That tup, therefore, cannot be fairly rated at more than ten guineas value; but when the most eminent sheep-breeders in the nation, as it were by universal consent, and during a long course of years, acknowledge the superiority of the Dishley breed beyond all others, by giving, in several instances, one, two, three, and sometimes four hundred guineas, for the use of a tup from that flock for a season, the matter seems to be completely decided. This must be the case, unless it can be supposed, that a majority of the proprietors and farmers of the first respectability, in point of judgment, intelligence, and success in husbandry, in every county of England where this breed has been established, can be supposed to have allowed themselves to have been duped by a single individual for upwards of forty years together. If further proof of the superiority of this breed be deemed necessary, it may be drawn from the concessions made by those who from prejudice, or self-interested motives, are anxious to depreciate it in the public esteem. While they strenuously maintain, that, upon the whole, the breed of their particular district is superior; yet they allow, that it is capable of being greatly improved by *a dash of the Dishley blood*. In short, it seems to be admitted by every impartial man, that the Dishley breed, in regard to docility, disposition to fatten

at



at an early age, and in lightness of bone and of-  
fal, is superior to every other in England.

When Mr Bakewell's exertions, perseverance  
and success, in improving that breed of sheep  
which was formerly of the greatest value, shall be  
faithfully detailed in the page of British history,  
then, but probably not till then, will it be known,  
how much this man deserved of his country,  
and how negligent it was in rewarding the ser-  
vices he had rendered it. It will scarcely be  
believed in future times, that Mr Bakewell, af-  
ter crossing the seas in quest of superior breeds  
of live-stock; and, after having exerted his ta-  
lents, and spent his time and his fortune, in at-  
taining the object he had in view, was allowed  
by the British Legislature, and the Board of  
Agriculture, to drop into his grave unheeded,  
neglected and forgotten; and that too, after ha-  
ving lived to see a portion of the public treasure  
of the nation voted to a man, who mounted in-  
to notice, as it were, in the course of a day, and  
who had at best but a disputed title to such a  
donation\*.

VOL. III.

D d

Had

\* Mr Elkington, who received a grant of L. 1000  
from Parliament for discovering a *new* method of drain-  
ing land; but of which Dr Anderson claims the merit,  
as having detailed the particulars in a publication of his,  
upwards of twenty years ago.

Had Mr Bakewell been bred to arms, and had he commanded and been victorious in a battle, in which ten thousand of his fellow creatures had met an immature death, while every street would have resounded with, "He comes, he comes, the hero comes!" the highest honours of the state would have been conferred upon him. But Mr Bakewell turned his attention to other objects; he studied only the peaceful arts; his ambition was not to destroy mankind, but by every possible means, to provide for the support of an increasing population, and to furnish the manufacturer with raw materials of a better quality, and in greater abundance. For deeds such as these, it would appear, the Legislature of this country has provided no reward. Had any such been held out, Mr Bakewell, without a rival attempting to interfere, would have carried off the prize.

In regard to the merit of Mr Honyborn, the nephew and successor of Mr Bakewell, the public can as yet form no correct opinion. Those, however, who have had the best access to know, are unanimous in thinking him thoroughly qualified for the arduous task he has undertaken, namely, *that of succeeding his uncle in the management of the most valuable breed of live-stock in the British dominions.* Considering the Dishley farm as the great national store-house,  
whence

whence the other sheep-farmers in the more fertile parts of the island are to draw their means of effecting still greater improvements in this valuable species of stock, it seems a duty peculiarly incumbent on the members of the Board of Agriculture, both individually and collectively, to afford Mr Honyborn that share both of countenance and patronage, which an undertaking so meritorious, and so likely to be productive of great national consequences, is entitled to receive.

SEC-



## SECTION IV.

*Swine.*

THIS species of live-stock is the foulest, the most gluttonous, and most wasteful, of all the brutal tribe that have hitherto been domesticated. Swine delight to live in mire and dirt, and seem fond of such coarse and putrid fare as almost every other animal abominates. Notwithstanding of this, they are found from experience to be profitable both to the breeder and feeder, and wholesome and nourishing, also as an article of human food.

Both Varro and Columella describe what was considered in their time as the marks of a good hog, *viz.* a small head, short legs, long bodies, large thighs and neck, and the bristles, particularly on the neck, thick set, erect and strong.

The breeding of hogs in Scotland, at least in any considerable number, is a branch of rural economy on which attention has been only recently bestowed. The only way of accounting for this circumstance is, that many of the Scotch peasantry had formerly, although this prejudice is now greatly abated, nearly as great an aversion to pork, on the score of taste as the Mahometans

metans have, on account of their religious principles.

In England it is very different; the farm-servants and labouring people in that country live very much on pork and bacon, particularly in the summer season; and there being consequently a very great demand for these sorts of animal food, the farmers, distillers, &c. find it advantageous to keep, in many cases, numerous herds of swine.

There are different breeds of swine in these kingdoms. The Berkshire and Hampshire hogs are the largest; but it is most probably from the Berkshire stock, that the greatest number of the varieties in England have sprung. They are of a very large size, the four quarters frequently weighing when fat, not less than from six to eight hundred weight; the medium weight of the hogs fattened for hams and bacon in England, will not, however, exceed from three to four hundred weight.

A breed from China has been for many years introduced, and is spread very generally over the country, particularly throughout the north of England and the south of Scotland. These, although much inferior to the Berkshire sort in point of size, possess, in a remarkable degree, a property which will always stamp a value upon every species of live-stock, a disposition to fatten quickly, and at an early age.

Along

Along the southern borders of the Grampian Mountains, and in almost all the Highland districts to the northward, there are hogs very frequently to be met with, whose appearance, being very different from that of any other sort in the island, denotes them to have been the original breed of the country. They are small, ill-formed, bristly, wild looking animals, and are very probably the remains of that breed, which we may suppose to have ranged through the forests and woody parts of the kingdom for ages in a state of nature. This breed is seldom seen in any part of the low country, except when brought down for sale about the close of harvest; and as more valuable breeds (the English and Chinese) are now very common where these formerly found a market, and as a great many of the Highlanders would rather starve than eat pork, there is little doubt but this breed will soon become extinct; should it so happen, the nation will not sustain any considerable loss.

Swine are a more prolific stock than any other that falls under the care of the husbandman. A sow goes four months with young, and has usually two litter of pigs in the course of the year. The number is extremely variable; sometimes only two or three, but more generally from six to twelve. Varro makes an observation on this subject, that seems of importance

to



to be attended to by those who are in the practice of breeding great numbers of swine; he remarks, that we may judge of the fruitfulness of a sow from her first litter; for she generally brings about the same number ever afterwards. Pigs that are intended for rearing are allowed to suckle six or eight weeks; when sold to the butcher, it is commonly at the end of three or four. The sow requires to be fed in an extraordinary manner while she is nursing, particularly if she have a number of pigs to support. Whey, skimmed milk, grains, wash from distilleries; in a word, almost any thing will do, if it be given in abundance. The pigs reared by the farmers are fed, for some weeks after they are weaned, on whey or butter-milk, or on bran or barley-meal mixed with water. They are afterwards maintained on other food, as potatoes, carrots, the refuse of the garden, kitchen, scullery, &c. together with such additions as they can pick up in the farm-yard. Sometimes they are sent into the fields at the close of harvest, where they make a comfortable living for several weeks on the gleanings of the crop; at other times, when the farm is situated in the neighbourhood of woods or forests, they are sent hither to pick up the beech-mast and acorns in the fall of the year.

When arrived at a proper age for fattening, which is regulated by circumstances to be afterwards

terwards explained, they are either put into styes fitted up for the purpose, or sold to distillers, starch-makers, dairy-men, or cottagers.

Swine are sold to the butcher at different ages, and under different names; as pigs when a few weeks old; as porkers at the age of five or six months; and as full grown hogs at from eighteen months to two years old. The young pigs are commonly roasted whole; the porkers are used as fresh or pickled pork; and the full grown hogs are for the most part converted into ham and bacon.

The demand for porkers, which, from London in particular, is very great, and which continues almost throughout the year, is chiefly supplied from the dairies within reach of that metropolis. From the time they are weaned, they are kept constantly on whey, or skimmed or butter milk, with frequently an addition of pease or beans, or barley-meal. Such good keeping not only makes them increase rapidly in size, but renders them fit for the butcher at an early age.

There are several modes adopted for fattening hogs, each materially different from the other: But such is the nature and constitution of the animal, which seems disposed to fatten on any sort of food, provided it receive an ample and regular supply; that it is probable there is less difference in the taste and flavour of its flesh, in consequence of its being fed on one sort of food

in

in pl  
such  
sheep

In  
of th  
much  
reari  
In th  
wood  
a cor  
autu  
slaug  
hom  
acor  
put  
with  
whic  
to th  
of p

T  
Eng  
as w  
ploy  
chee  
skim  
of f  
fatte  
dail  
for  
offal

V

in place of another, than is perceptible under such circumstances in that of either cattle or sheep.

In Hampshire, Gloucestershire, and some others of the forest-districts, beech-mast and acorns are much used, not only as food for hogs while rearing, but also as means of fattening them. In the former case, the hogs are driven into the woods, and allowed to forage for subsistence for a considerable part of the year, as well as in autumn: In the latter, those intended for slaughter in the end of the year, are brought home from the forests soon after the fall of the acorn and beech-mast is over; they are then put into styes, and their fattening is completed with the same sort of food, (a great quantity of which is collected by the poor people and sold to the farmers for the purpose), with an addition of pease or beans, or barley-meal.

The dairies are the great sources whence the English butchers draw their supplies of hogs, as well as porkers. Just as the dairies are employed, either in the making of butter, or of cheese, so whey mixed with barley-meal, or skimmed and butter-milk, are the chief sorts of food on which the hogs on a dairy-farm are fattened. Many are the incidental additions daily made to the stock of provisions set apart for the fattening hogs; in short, every sort of offal from the dairy, the kitchen, &c. is thrown



into the trough; but milk and whey, or barley-meal, with an allowance of pease and beans for a few weeks before they be killed, constitute the chief articles of food given to fattening hogs on all dairy-farms.

Very great numbers of hogs are annually fattened at the distilleries in the various parts of these kingdoms. It is stated in the Report of the county of Surry, that between nine and ten thousand are fattened on the grains, wash, and other offals of three distilleries only in that district. From this some idea may be formed of the total number of hogs thus annually made fit for the butcher. In the first stage of fattening they are only allowed grains and wash; but for some weeks before they are ready for market, they are allowed daily a certain quantity of meal or grain; this not only brings them faster forward, but renders their flesh firmer, and better adapted for curing as salt provisions, the use to which it is for the most part applied.

Perhaps of all the modes in which hogs are fattened, that adopted at the corn-mills and starch-works is the best; while the food on which the hogs are fattened (the refuse of grain) is freeest from any nauseous mixture; it is also more nutritive than any other that is applied to the same use. Considering how many corn-mills and starch-works are erected in these kingdoms, and that at all of them, there is a certain

number

number of hogs, the number annually fattened at these places must be very great.

There yet remains another method to be described; and, whoever will reflect, that it is adopted by the great body of the farmers and cottagers in Great Britain, will be satisfied, that more hogs are fattened in that way than in any, or in all the others above mentioned. There are few farmers of any note, who do not fatten some hogs annually; and in England very few cottagers who have not one or two for the use of their families. The farmer usually rears them about the farm-yard, at a mere trifle of expence; and when arrived at a proper age for fattening, a few potatoes, the refuse of the kitchen and garden, with a small allowance of corn, complete the business. The cottager purchases his pig or two when he can do it for the least money; they are allowed to feed on the common or in the forest during summer; and about the close of harvest are taken into better keeping, which generally consists of potatoes, or other vegetables, and the offals from the house, with the addition of a few pecks of corn, either purchased for the purpose, or gleaned by the children in some adjoining field.

The ordinary season in which full grown hogs are slaughtered, is from the end of October to the end of March, that being the best time for salting provisions of any kind. The

methods

methods usually practised in this country for curing ham and bacon are so well known, that a detail of the particulars would be uninteresting; but as Westphalia has been long celebrated for the superior excellence of the ham and bacon cured there, a description of the method practised in that country, is extracted from Bradley's Treatise on Husbandry and Gardening\*, for the information of the reader. "The method used to cure bacon in and about Ham-

"burgh and Westphalia, is after this manner:

"Families that kill one, two, or three hogs a year, have a closet in the garret joining to their chimney, made very tight and close to contain smoke, in which they hang their bacon to dry, out of the reach of the heat of the fire, that it may be gradually dried by the smoke only, and not by heat. The smoke is conveyed into the closet by a hole in the chimney near the floor, and a place made for an iron stopper to be thrust into the funnel of the chimney about one foot above the hole, to stop the smoke from ascending up the chimney, and force it through the hole into the closet. The smoke is carried off again by another hole in the funnel of the chimney above the said stopper, almost at the ceiling, where

\* Vol. i. p. 364.



“where it vents itself. The upper hole must  
“not be too big; because the closet must be al-  
“ways full of smoke, and that from wood fires;  
“for coal or turf, or peat smoke, I apprehend,  
“will not do so well.

“The manner of salting is no other than as  
“we salt meat in common; sometimes they use  
“our Newcastle salt, or St Abb’s, or Lisbon  
“salt. In those parts they do not salt their  
“bacon or beef so much as we do in England,  
“because the smoke helps to cure as well as the  
“salt.”

As this species of live-stock, detestible as it is in many respects, does certainly possess many properties in a superior degree to the other sorts, or rather peculiar to itself, the improvement of the breed is by no means an object that ought to be considered unworthy the farmer’s attention. It is a more prolific animal, and its flesh also sells as high if not higher, than that of any other. Its flesh is, besides, of all others the best for salting, and will keep when properly cured, for the longest period. Its fat or lard, is more valuable than that of other animals; its very hair (bristles) are useful in various articles of manufacture; and what also ought to have its weight, swine will live on such aliment as every other animal would reject.

The

The circumstances to be attended to in endeavouring to improve the breed of swine, require not to be detailed, as they are generally well known. Smallness of bone and offal, and a disposition to fatten quickly, and at an early age, are the most essential particulars that the farmer ought to keep in view.

SEC.

## SECTION V.

*Rabbits.*

THERE being many thousand acres of the light sandy unproductive lands in these kingdoms occupied as Rabbit Warrens; and a much greater extent that is better adapted for that system of husbandry than for cultivation or planting, it cannot be deemed improper to give a short account of the management of lands so occupied.

There are two varieties of this species of livestock in this island, and which are more or less valuable, according to the uses to which their fur is applied. The common grey is the most prevalent, the fur of which is chiefly used in the manufacture of hats.

The other sort, imported originally from Ireland, is distinguished from the former by the name of the Silver-grey. The skins of the silver-grey rabbits, being for the most part dressed as furs, and exported for the use of the higher classes of people in China, are double in value to that of the others.

Rabbits always burrow, or scrape out lodgements in the drier, and commonly in the most elevated



elevated parts of the warren. They are a sort of stock that require very little attention, except during severe weather in winter, when it is necessary to furnish them with a supply of food beyond what they are able themselves to procure. Hay or turnips, when rabbits are managed with that degree of attention that is necessary to render a warren productive, are usually scattered on different parts of the feeding ground during the latter part of winter and beginning of spring. The possessors of rabbit warrens in Suffolk have lately found out a new and ingenious method of furnishing rabbits with the means of subsistence at these seasons. They scatter billets of new felled wood in different parts of the warren, the bark of which the rabbits eat with great avidity, and thereby a small quantity only of hay, if any, becomes requisite.

The most solid objection against warrens, is, that the rabbits frequently stray into the neighbouring corn-fields, and often materially injure the growing crops. This is a consequence naturally to be expected, where the warrens and the corn-fields are in an open-field state. The warrens, however, particularly when situated near tillage-lands, are for the most part inclosed. This is performed in different ways; sometimes by stone-walls or paling; but the more common

common practice is, to erect fences of turf, and to cape them with withered furze, thorns, &c.

There are several methods used for catching rabbits; it was formerly the practice to train small dogs or ferrets, for the purpose of going into the burrows; but this has been long since disused, and has given way to other methods, by adopting which, a power, both of selection and reprieve, is reserved to the farmer. Rabbits are now caught either in nets or traps: When the former method is adopted, the nets, set in the form of a fold, are placed between the burrowing and the feeding grounds during night, or very early in the morning, and the rabbits, in returning to their lodgments, are hunted into these folds. The traps used are large pits, dug in the way to the most usual haunts of the rabbits, and covered by a kind of folding or falling door, with a small trap-door towards its centre, into which the rabbits are led by a narrow mule or track\*.

In emptying the pit, the rabbits are sorted; such as are fat, and in season, are slaughtered; and those that are lean, or otherwise out of condition, are reprieved, either for the purpose of fattening or breeding.

In

\* See Marshall's Rural Oeconomy of Yorkshire, Vol. ii. p. 266.

In regard to the value of a rabbit warren by the acre, much depends on local situation. If, within reach of a large town, where there is a constant demand for the flesh of these animals, it is considerably more than in a remote part of the country, where the carcase brings comparatively a small price.

In situations not remarkably favourable, the flesh of a rabbit sells at from fourpence to sixpence, while the skin brings from sixpence to tenpence, according as this sort of fur is in request among the hat and other manufacturers. Mr Young estimates, in some of his writings, that ten rabbits are killed yearly from every acre of a warren. If that be the case, and the prices above mentioned be accurately stated, which, it is believed they are, the medium annual value of a rabbit warren, by the acre, without deducting the price of hay, turnips, &c. which cannot be ascertained, may be rated at ten shillings and tenpence the English acre,—a much greater sum, without doubt, than such lands as are commonly occupied in this way, would produce under any other management.

Considering the numerous large tracts of light barren sandy lands that are situated in many parts along the eastern coasts of these kingdoms in particular, which in their present state are  
of





## CHAPTER XXII.

*The Management of a Dairy.*

**D**AIRY Husbandry, in its different branches, is more or less established in every county in Great Britain: Few of them, however, can boast of having arrived at any excellence in the art. Gloucester, Chester, Wilts, and a few others in England, and Ayrshire in Scotland, stand first in the list of cheese-making districts\*; while Essex, Cambridge, and Suffolk, are equally celebrated not only for the quality but the quantity of butter that is thence exported to London and other markets. In some parts of England, the breeding and rearing of live-stock occupy to a great degree the attention

\* There is a greater quantity of good cheese made for the public markets in Ayrshire, and in the borders of Renfrewshire, than probably in all Scotland besides. There this branch of husbandry is established as a regular system. The cheese is well known in many parts of Scotland and America, under the name of *Dunlop-cheese*.

tion of farmers ; while, in others, the pastures are chiefly devoted to the fattening of cattle and sheep. In Scotland, with the exception above mentioned, dairy-husbandry is certainly in its infancy. At the houses of the proprietors and principal farmers, it is true, that cheese of a tolerable quality, and butter inferior to none in the island, are always to be found ; but the butter and cheese made in common in the country for the supply of the towns, is in general of so inferior, so bad a quality, that no man, who possesses any degree of veracity, however partial he may be to his native country, will ever attempt to speak or write favourably of it. What was said of the Scotch dairy-husbandry, by a writer of the last century, is very applicable to the present times : “ The next thing I shall speak of,” he says, “ is concerning the making of butter and cheese, and, to say no worse of it, our women, generally throughout this kingdom, *kyth* (shew) as little dexterity in this as in any point of housewife operations I know\*.”

In establishing and managing a dairy, several particulars merit attention. The dairy-house should be so large, in proportion to the number of cows to be kept, that there may be sufficient convenience for performing all the necessary operations without embarrassment. It cannot be kept too cool in summer ; nor can too much attention be given

\* Donaldson's Husbandry Anatomized, p. 85.



to cleanliness in every situation. For these reasons its being placed near a spring or rill of water, and where practicable, overshadowed with trees, may always be considered as important matters in regard to the situation of a dairy. It should be neatly paved either with brick or stone, that when washed, which should be done every day, the water should not sink through so as to create an improper damp. The dairy-house should also be well ventilated, and a full circulation of air permitted; but as it is also necessary to have the power of excluding too great a quantity, lattice-windows, made to alter at pleasure, are much preferable to the common sort, which, in the summer-months, admit too freely the rays of the sun. The utensils should also be kept perfectly clean, be frequently scalded with hot water, and afterwards scoured and brushed with great care and attention. The vessels in which the milk is set, ought to be thoroughly scalded and cleaned every time the milk is taken out. Without these precautions it is impossible that the produce of a dairy, whether of butter or of cheese, can be of superior quality, or such as will keep sweet and good for any length of time. Cleanliness may indeed be said, not only to be necessary in dairy-husbandry, but to be the foundation,—the most essential and least indispensable part, of good management. A farmer may be in possession of the most valuable breed of cows,

and

and these be fed on the richest pastures; but unless cleanliness prevail in the dairy, his butter or his cheese will never stand high in general estimation.

Next to the size and situation of the dairy-house, and to keeping it and the utensils clean, skill and attention in the general management fall under consideration. Whoever has had occasion to superintend the operations carried on in a well conducted dairy, even for an hour, must have been satisfied, that skill was as requisite in the person who directed, as attention and alacrity in those who executed. In a word, it must to such have appeared obvious, that without a knowledge of the best modes proper to be adopted under every circumstance, and a regularity, method, and prompt attention to the execution, the business of a dairy would, in a short time, go into inextricable confusion.

In describing the dairy-husbandry of Great Britain, it appears necessary to divide the subject into as many sections as there are modes of conducting the business; or more properly, as there are principal objects to which the dairy-men direct their attention. These will be found classed in the following order:

#### Section I.

**Section I. Dairy management, where the milk, fresh from the cow, is sold for the use of the inhabitants of towns.**

**H. Ditto, where butter is the chief object.**

**III. Ditto, where butter and cheese are both made.**

**IV. Ditto, where cheese only is made.**

**V. General observations on dairy-husbandry, the methods of feeding cows, &c.**

## SEC-

In describing the dairy husbandry of Great Britain, it appears necessary to divide the subject into as many sections as there are modes of conducting the business; or more properly, as there are principal objects to which the dairyman directs his attention. These will be found classed in the following order:

**Section I.**



## SECTION I.

*Dairy Management, where the Milk, fresh from the Cow, is sold for the Use of the Inhabitants of Towns.*

IN the agricultural description of the county of Middlesex, the number of cows necessary for supplying the inhabitants of London with this article was mentioned. Although no other town in the island requires nearly so great a supply, yet in the suburbs of every town of any magnitude, there are a description of people called Cow-keepers, whose business it is to supply their customers with new milk regularly every morning and evening. This branch of dairy-husbandry, although necessary for the accommodation of the people in towns, does not give room for a long detail of the particulars of management. In the neighbourhood of London, the owner of the cows takes no concern about the milk; the whole of his attention is devoted to other objects; namely, purchasing the best cows he can procure, and feeding them in such a manner as to make them produce the greatest quantity of milk. He contracts for the milk of a certain number of cows with the milk-dealers, a set of people who make a trade of disposing of it in town. These people attend every morning

and evening for the purpose of milking the cows, and when the milk is measured over to them, the dairy-man's charge and trouble, in regard to that part of the business, is at an end, as the after management and risk of sale devolve on the dealers. These people are generally, and the writer believes justly, reckoned very expert at cooking up the milk for market; and various means are said to be used for that purpose. They, it would seem, are apprehensive that milk fresh from the cow would be too strong for the debilitated constitutions of the generality of their customers, and on that account they are in common very attentive to dilute it plentifully with water.—In the neighbourhood of towns of less note, the cow-keepers are the sellers also of the milk, and which they usually do in a more pure and less adulterated state.

The cows kept in such dairies as above described, are fed in a different manner from those in the more remote parts of the country. Except during the height of the grass-season, they are maintained chiefly on malt-grains and hay, with sometimes turnips and potatoes, and in many instances are confined to the cow-houses or sheds almost throughout the year. A great quantity of milk being, in such situations, the chief object of the dairy-farmers, every degree of attention is bestowed, both by feeding high, and at regular stated intervals, to increase the quantity as much as possible.

S E C.



## SECTION II.

*Dairy Management, where Butter is the chief Object.*

To the class of dairy-farmers mentioned in the former section, succeed, in point of local situation, those whose principal object in keeping cows, is supplying the inhabitants of the towns with fresh butter, and of which, as it is an article that cannot be carried to a great distance, they may be said to have the exclusive sale.

It is almost unnecessary to mention, that butter is the fat, or oily part of milk, extracted or separated therefrom by means of motion. In the management of milk, after it is drawn from the cow till the butter be extracted, many particulars merit attention.

Before entering into a detail of the methods usually adopted, it may not be improper to mention those which have been long common in Devonshire and Cornwall; and which, if not superior to any other, have at least singularity to recommend them\*.

The

\* Bradley's Treatise on Husbandry and Gardening, vol. ii. p. 306.



The reader will be surprised to learn, that in those districts the use of the churn, even to this day, is in a great measure unknown. The Agricultural Report of the county of Devon contains the following particulars respecting the dairy management in that part of England.— They put the milk into pans, either made of copper tinned, or of brass, or into brown earthen vessels glazed, which they place on a stove, gently heated with charcoal, and scald it until the cream be raised to the surface by the operation of the heat. When it has continued on the stove a certain time, which the dairy-maid judges of by practice, bringing it as near to boiling as possible without doing so, it is then set to cool. Twelve hours are sufficient to stand in winter, although it generally remains from four o'clock in the afternoon to seven the next morning. Sixteen hours are customary in summer. The cream is then taken off, and it is worked up by the hand, without any churn, into butter. The operation is performed by the dairy-maid's turning the cream round with her hand in a circular motion, always moving it in one direction, which unites the particles together.

By thus scalding the milk, the cream is forced up to the top with greater effect, than when it is allowed to rise naturally and gradually in the ordinary way. The cream so obtained is called  
scalded,

scalded, and sometimes clouted cream, from its being of a more tough and gluey nature than what is, in some of the neighbouring districts, by way of distinction, termed raw-cream. Bradley, in the Treatise before quoted, says, that he remarked the butter in Devonshire tasted of smoke, and was apt to grow rank soon after making, which he attributed to the above-mentioned mode of management, especially to the using brass pans, as brass generally communicates part of its rank quality to any liquor, and more particularly when it is allowed to remain in these vessels for twelve or sixteen hours at a time.

In regard to the cleanliness of this method of making butter, it is unnecessary to make any remark; the reader will at once be satisfied, that if cleanliness ought to be recommended and adopted in the management of dairies in other parts of Great Britain, cleanliness in the dairy-maids of Devonshire seems most essentially requisite.

The most approved management of butter-dairies in Great Britain, may, it is hoped, be learned by a perusal of the following particular detail.

When the milking of the cows is completed, which is usually effected by six o'clock in the morning, and before seven in the evening,

ing\*, the milk is strained through a hair search or sieve, into large square shallow cisterns, covered with lead, or into wooden vessels, in Scotland called cogs, and in Gloucestershire, and some other places in England, skeels; there it remains for some time, according to the state of the weather, and other circumstances. The milk is commonly set to the depth of five or six inches in the cogs; but when leads or cisterns are used, which is generally the case in England, from two to three inches is the usual depth. Setting out milk in large shallow cisterns, is certainly much preferable to the other method, as a greater quantity of cream is not only by that means obtained, but it is also found from experience, particularly in Cheshire, that the expeditious cooling of the milk, has considerable influence in preventing its tendency to acidity in warm weather. At the same time it ought to be observed, that, while the English method is in this respect preferable to that adopted in Scotland, the practice of using lead for covering these cisterns or coolers, is certainly improper and dangerous; as although these lead coverings may be kept very clean, by rubbing or scouring them with salt, sea-sand, &c. yet nothing can prevent a certain portion, at least, of the poisonous quality of the lead

\* In Scotland, it is very common to milk cows three times a-day during the grass season; in the morning, at mid-day, and in the evening.



lead from affecting the milk, especially if it be allowed to remain in the cisterns for any length of time.

There are two methods of separating the cream from the milk; that most generally practised, is to skim it off with a skimming-dish, made either of tin or of wood \*. The other is adopted only where leads or cisterns are common, and where the milk is used for making skim-milk or two-meal cheese; and of course, before it coagulate, or acquire any degree of acidity. Towards the centre of the cistern, there is a hole or pipe, which, before the milk be put in, is shut with a wooden stopper, that rises several inches above the surface of the milk. When the milk is wanted for any of the purposes above mentioned, a vessel is placed under the pipe, and the stopper drawn up so far as to allow the milk to run off, but so gently, that the surface of the cream is not broken. The milk being thus gradually drained off, the cream sinks down, till it at last rests on the cistern, when the vessel containing the milk being removed, and another placed for the purpose of receiving the cream, the stopper is entirely drawn out, and the cream drops into the vessel.

The

\* Milk, in the usual management, is never skimmed but once. In the county of Essex, however, the usual practice is, to skim it three or four times, or till no more cream rise; when the milk is given to the hogs.

The cream, when separated from the milk, is put into large earthen jars, or into wooden vessels made with staves and hoops, in the form of a small cask, but open at one end. It is difficult to state any particular period for its being kept in these reservoirs before churning, so different is the management in this particular. About Epping in Essex, which has been long in high repute for the superior quality of its butter, the cream is seldom kept above three, or at farthest four days.

It was the practice in a large dairy in Suffolk, which the writer was led to visit some years ago, on account of the character it had obtained for making butter of a superior quality, when the butter was to be sent directly to market, to churn the cream the second or third day; but when it was to be salted, the cream was kept a day or two longer, or till it had acquired a certain degree of acidity. The dairy-woman, who had had long and extensive experience, accounted for her conduct in this respect, by observing, that butter made from fresh cream was much better, and pleasanter to the taste, but that it would not take in the salt so well, nor keep so long, as that made from cream that had been longer kept.

During summer, or while the cows are fed on grass, no art is requisite to give butter that colour which is agreeable to the purchaser or the consumer;

consumer; but in the winter and spring months, the dairy people find it necessary, in order to please their customers, to alter that tallowy colour which is natural to butter in these seasons. This is done by using a little Spanish arnetta, which after being pounded, or otherwise reduced to as small particles as possible, is mixed with the cream before it be put into the churn, and in such quantities as, from experience, has been found necessary for giving the desired colour.

There are three sorts of churns used in these kingdoms, and these are worked in very different ways. The most ancient is the plump or plunge churn, called in some places the standing churn, in contradistinction to the common barrel churn, which is kept constantly in motion during the operation of butter-making. The standing churn is of very simple construction, being a wooden vessel between three and four feet high, and from eighteen inches to two feet in diameter at the bottom, becoming narrower towards the top. The plumper, or the instrument by which the cream is kept in motion, is nothing more than a piece of round board, bored or cut into holes in several places, and fixed to a long handle by which it is worked. This handle being passed through a hole in the cover of the churn, a person keeps constantly moving it upwards and downwards till the butter or buty-raceous particles unite.



The common barrel churn, which is of later invention, is of more general use than any of the others. It is a barrel made in a bulging form, being several inches more in diameter at the middle than at either end, and of greater or less size according to the extent of the dairy, or the number of cows that are milked. It has boards called dashers, fixed end-ways within, which by agitating the cream several times at every turn of the barrel, greatly facilitates the work. It is supported on a frame of wood by two iron rods, one fixed to each end. The one rod rests on one of the posts of the frame, and turns on a pivot in a notch made in the post, the other supported by the opposite post, forms the handle by which the barrel is set in motion.

The other is of still later invention, and it is also of the barrel form. It is called the Patent Churn, from the circumstance of the inventor having procured a patent for making churns of that description. It differs from the other barrel churn, only in that it does not move round, and that, like the standing churn, it admits atmospheric air through a funnel left open in the top. A rod of iron, forming the handle at the one end, is passed end-ways through the centre of the barrel, and rests on the two frames, in the manner before described. Within the barrel is fixed a kind of axle round the rod, in which are placed four rows of spokes, at regular distances,

distances, and fixed at the extremity by four bars of wood, so that, by turning round the handle, the frame-work within acting four times at every going round, keeps the cream in constant motion.

From the practice generally adopted in the best managed dairies of cooling the churn, by filling it for some time with cold water before churning, in summer, and of warming it with scalding water, when the weather is very cold in winter, and of putting in also cold or hot water among the cream in the churn occasionally, according to the season of the year, it is obvious, that cream possessing a proper temperature, whatever that temperature may be, is, among the most exact dairy people, considered essentially necessary in the making of good butter. That being admitted, it follows, that the first or the last of the churns above mentioned, by admitting freely a supply of atmospheric air, and permitting that which, from the violent agitation, has become overheated, to escape, are better calculated for preserving that medium temperature which, it would appear, cream, in the course of making into butter, ought to possess, than the common barrel churn, which is kept constantly shut up, or where the air is only allowed to enter or escape, by sometimes drawing a plug placed near the mouth of the barrel,

When

When the operation of churning, which consists in keeping the cream constantly in motion till the butyraceous particles separate from the milk and adhere to each other, is completed, the butter is taken out of the churn, and put into a skeel or cog, along with some cold spring water, where that can be procured. The dairy-maid then, when she is attentive to her business, and has a considerable quantity of butter to manage, must undergo a considerable degree of labour; and which, being of that sort on which in a great measure the quality of the butter depends, it may not be improper here minutely to describe.

After the butter is put into the skeel, and the water poured over it, the dairy-maid begins by kneading it with her hands, and afterwards breaking it into as minute divisions as possible; and by rolling and pressing it against the bottom of the vessel, endeavours to express any milk that it may contain. When it has thus been well worked, the milky water is poured out, and an additional quantity of pure clean water put in; and the operations of kneading, breaking and pressing are again renewed, and continued till the water at last appears scarcely tinged with milk, which is the only proper criterion by which to determine when the butter has been thoroughly worked.

In



In most cases a small quantity of salt is mixed with butter intended for immediate use; when butter is salted, whether with a view to keeping, or for immediate sale, the salt is usually applied immediately after the milk has been extracted in the manner above described. Part of the butter is spread on the bottom of another skeel, which had been previously washed and prepared for the purpose; and a quantity of salt being strewed over it, an additional layer of butter is then laid on; over this another sprinkling of salt; and so on alternately till the whole be salted to the proper degree, according to the use for which the butter is intended. When the whole is thus salted, the dairy-maid again kneads, breaks and works it in such a manner, as to make the salt mix intimately with it; and when she thinks she has effected this purpose, she pours some spring or other cold water over the whole; and by again working the butter, she washes it free from the brine, and from any milky substance, which by the salting, and the repetition of kneading, pressing, &c. may have been expressed.

The operations of butter-making, and such as are deemed necessary to be performed preparatory to its being sent to market, being now gone through, all that remains is to weigh and make it up in the form in which in that particular district it is most saleable. In some places it is weighed

weighed in pounds, containing from 16 to 28 ounces, according to what is rated a pound of butter in the market where it is to be sold. In others it is made up partly into pounds and partly into half pounds, so as to suit the convenience or taste of the purchasers. The usual form in which it is exposed to sale is in rolls; but it is sometimes made into circular cakes of about three or four inches diameter, and about an inch thick, and on the top of which some figures are impressed, by means of a wooden print carved for the purpose. When the butter (in well managed dairies at least) is weighed and made up for market, it is usually placed in cold water till the period for sending it to market arrives. When that happens, in those districts where cleanliness is attended to, every print or roll is packed in the large green leaves of the garden orach, a plant frequently cultivated for the purpose, or in those of kidney beans, &c. The method used in packing butter for market in the vale of Gloucester, is in every respect so superior to what is common in other places, and so well meriting general imitation, that Mr Marshall's account of it is here subjoined: "In packing a  
" butter-basket, the bottom is bedded with a  
" thick cloth folded two or three times; on this  
" is spread a fine thin gauze-like cloth, which  
" has been dipped in cold water; and on this is  
" placed the prints, with a large leaf beneath,  
" and

“and a smaller upon the centre of each. The  
“bottom tier adjusted, a fold of the cloth is  
“spread over it, and another tier set in a si-  
“milar manner. At market the cloth is re-  
“moved, and the prints partially covered with  
“leaves, are useful, as well as pleasing to the  
“eye. They serve as guards to the prints.  
“The butter is taken out of the basket as  
“well as put into it without being touched, or  
“the prints disfigured \*.” When butter is  
salted with a view of disposing of it as salt-but-  
ter, it is in England commonly put into small  
casks called firkins, containing 56 lb. each, and  
sold in autumn to the butter-factors or cheese-  
mongers in the large cities or towns. In Scot-  
land, families residing in towns generally cause  
make small casks, there called kitts, which they  
send to some of their acquaintances in the coun-  
try to get filled with butter in the course of the  
summer or autumn months; by this means little  
salt-butter is sold in the shops of Scotland, and  
what is, is of the most inferior quality.

The above is the most approved methods of  
making and of managing butter in those dairies  
situated within reach of markets, at which the  
butter produced in the dairy can be regularly,  
and to a certainty sold every week, and in which

the above is the most approved methods of  
making and of managing butter in those dairies  
situated within reach of markets, at which the  
butter produced in the dairy can be regularly,  
and to a certainty sold every week, and in which

\* Marshall's Rural Oeconomy of Gloucestershire,

Vol. i. p. 285.



the making of butter is on that account the farmer's chief object. These, however, cannot be said to be generally adopted. That others, in every respect inferior, are too common, is a fact which every person who depends on the public markets for a supply of this necessary article will be disposed to attest. That such neglect shown to the quality of the butter sold in the public markets should still prevail, notwithstanding the many repeated complaints made on the subject, reflects certainly no small degree of disgrace on the police of many towns; while the instances, especially in Scotland, are very rare, wherein the attention exercised in this respect is so regular or so minute, as to obviate the evils complained of, or to prevent a nauseous abominable rancid stuff, exhibited often in the most questionable shape in regard to cleanliness, from being exposed to sale under the denomination of fresh butter. If proper searchers were appointed, as in Yorkshire, the quantity of *butter* sold in the markets of Scotland would, as sometimes happens in that district, be greatly reduced, while that of *grease* would be increased in equal proportion.

The quantity of butter produced from a given quantity of milk, depends on a variety of particulars; as, the quality of the milk, the age and quality of the pastures on which the cows are maintained, and whether the milk is allowed to stand a sufficient time to throw up the whole

cream which it contains. On a medium, four gallons of milk will produce sixteen ounces of butter ; and the quantity which a dairy of cows of any magnitude, in regard to numbers, may be supposed to yield, may be rated at six pounds *per week* in summer, and from four to five in winter, according to the manner of feeding.

In the following section, the method of making butter from whey, a practice very common in the dairy-districts in England, although scarcely known in Scotland, will be particularly described. In the mean time, a practice which has in several instances been introduced in both kingdoms, *viz.* that of churning the whole milk, merits a minute description.

The milk is set to cool in the manner already mentioned, either in leads or in skeels, or other wooden vessels, according to the custom of the particular district. When it is cooled in leads, in place of being allowed to stand there till the cream be thrown up, it is in a few hours put into earthen jars that contain from four to five gallons each, where it remains till it become coagulated, by which time it uniformly acquires a greater or less degree of acidity. This, in summer, takes place naturally in twenty-four or thirty hours, and in winter the vessels containing the milk are placed either near the fire, or, where that convenience is erected, close to the stove in the dairy. A considerable de-

gree of management seems requisite in regard to the milk, when the whole is churned. If it have not been sufficiently cooled in warm weather before it be put into the jars, it is apt to curdle and ferment; and if it be not churned soon after it coagulates, the butter will neither be so good in quality, nor so large in quantity, as if it had been managed with greater attention, and churned at the proper period.

The old-fashioned standing churn is in common use in the dairies where the whole milk is churned. In some places it is worked by a lever, one end of which, supported by an upright frame, is fixed to the end of the churn-staff, and the other is connected by a rod to a crank in a toothed wheel, which is worked by a pinion fixed upon the axis of a common winch. By this contrivance, which is extremely simple, the business of churning considerable quantities of milk is performed by one person, and without requiring any extraordinary exertion.

A gentleman in the neighbourhood of Edinburgh, Mr Johnston of Hillhouse, has erected a machine on a very ingenious construction, for the purpose of facilitating the operation of churning; it is turned by a horse, and works three or four churns, each containing between twenty-five and thirty gallons at the same time. If the practice of churning the whole milk shall be found preferable to the more common  
mode



mode of churning the cream only, (for the superior advantage of this new method remains yet to be ascertained), the introduction of machines similar to that erected by Mr Johnston, cannot fail to prove beneficial in large dairies, where this practice may be adopted. In respect to the management of the butter in the dairies last above mentioned, there is nothing occurs worthy of remark.

The butter-milk, it was formerly observed, was for the most part used in fattening hogs. In the north-west of England, as Westmoreland, Cumberland, &c. and in every part of Scotland conveniently situated in regard to market, the milk from the butter-dairies is usually sold to the poor people in towns and villages, and at from a penny to twopence the gallon. In the more remote parts of these districts, the farm-servants, labouring people and cottagers, also use it as an article of food.

SEC-

## SECTION III.

*Dairy-Management where both Butter and Cheese are made.*

IN all dairies where skim-milk and two-meal cheeses are made\*, the produce of butter, conform to the quantity of milk, is considerable. It is a common and a well-founded observation, that good butter and good cheese are incompatible in the same dairy; but whether making both butter and cheese from the same milk may not, upon the whole, be the most productive mode of dairying, is both a curious and an interesting inquiry.

Besides rearing and fattening calves and pigs, which is more or less practised on every dairy farm, in the various ways already taken notice of, the management of a dairy, where both  
butter

\* A morning or an evening's milking is called a meal of milk; hence, when the milk of this evening is mixed with that of to-morrow morning, and made into cheese, it is called a two-meal cheese.

butter and cheese are made, may be described under four heads, *viz.*

Butter from Cream,

Skim-Milk Cheese,

Two-Meal Cheese,

and

Butter from Whey.

*Butter from Cream.*—It was mentioned in the last section, on the authority of a respectable dairy-woman in Suffolk, that butter made from fresh cream was better for immediate use, although not so good for salting, as that made from cream which had been allowed to remain so long as to contract a degree of acidity. For this reason, butter made of cream skimmed from milk intended to be made into skim-cheese, or from the first meal of two-milk cheese, must be better when used as fresh butter, than that made from milk which had been allowed to coagulate naturally before the cream was removed. In regard to management in either of these cases, there is no difference from the methods before described, than that the dairy maid has it in her power to make the cream into butter while it is quite fresh and sweet, which cannot happen in the other case.

*Skim-Milk Cheese.*—It is proposed, in the following section, to describe as accurately as possible



fible the whole process of cheese-making as practised in the county of Chester, and, on that account, such particulars only, in which the process of making skim-milk and two-meal cheeses differ from the most approved modes of making one-meal cheeses, will fall now under consideration. When skim-milk cheeses are made, the milk is set out in the leads or cisterns, or other vessels, generally to the depth of the second joint of the dairy-maid's forefinger, that being the gauge most usually applied. In this state it remains longer or shorter, according to the weather, care being taken to skim off the cream, or to drain off the milk, in proper time, before it begin to acquire a sourish taste. If that should at any time happen, either from the excessive heat of the weather, or owing to some inattention in the general management, in place of putting the skimmed milk into the furnace to give it that degree of heat supposed necessary for facilitating the coagulation after the rennet is applied, and which is the usual practice, the method is, to put it direct into the cheese-tub, and to pour in such a quantity of hot water as will give the wished-for temperature. By this means, the risk of the milk breaking while heating in the furnace, which, when not quite sweet and fresh, it is apt to do, is avoided, while the intention must in every other respect be as fully answered.

After

After the milk is heated by either of the means above mentioned, and put into the cheese-tub, the only particular necessary to be attended to in making this sort of cheese, beyond what will be afterwards explained, is to add somewhat more rennet than is usually applied to a similar quantity of milk, which contains either the whole or a great portion of the cream.

*Two-Meal Cheese.*—The quality of milk used in making cheese of this description is very different. In many cases the whole of the cream of the first meal is abstracted, and in every case a certain portion. In general the quantity is very uncertain, depending on the quality of the pasture, and not a little on the disposition of the farmer in regard to avarice; or, in other words, a desire to make the most of his dairy, without being solicitous about the character or superior excellence of his cheese.

In the dairies where two-meal cheeses are made, the milk of the first meal is set abroad in the leads or other vessels in the usual manner; and as it is the evening's milk that is in common added to that of the succeeding morning, where this method is practised, the operation of cheese-making commences immediately after that of the morning making is completed, that is, about five or six o'clock. The cream of the evening milk being skimmed off, the milk is carried and put into the cheese-tub, reserving  
sometimes

sometimes a half, sometimes a third, but more frequently only three or four gallons, to be applied to purposes now to be described. The milk that is reserved, which we may suppose to be three or four gallons, being put into a brass pan and made scalding hot, by placing the pan in a furnace or vessel of hot water, the half of it is poured into the cheese-tub among the cold milk, and the other half into the pan in which the cream had been put. The cream and the hot milk being intimately mixed together, the whole is poured into the cheese-tub, which by this time has received a great addition, if not the whole of the morning's milk, warm from the cows. Thus the milk of the former evening, warmed to a certain degree by the means above mentioned, together with the cream after it has been returned as much as possible into the milky state, by being incorporated and intimately blended with part of the scalded milk, and added to the milk new drawn from the cows, forms, as it were, a body of fluid of the same nature, equal in quality and temperature, and to which rennet is applied in the usual way. The above mentioned method of remixing, or in the dairy phrase melting the cream, is, the writer has reason to believe, the best that is any where practised: But it appears extremely *doubtful*, whether this method is so effectual for answering the intended purpose, as to render cheese made of  
milk



milk so managed, and without the addition of any fresh from the cow, equal in quantity and quality to that made entirely of new milk, for that is the only proper criterion by which to judge. There is not perhaps one dairy-man in the island, who has hitherto made such a course of experiments as to enable him to decide on this point with precision.

The matter is however of considerable importance to have ascertained, and merits the particular attention of the more intelligent farmers in the districts where this sort of cheese is generally made.

*Whey-Butter.*—The practice of making butter from whey is a branch of a dairy management, the particulars of which must be both curious and interesting to many readers; for although it is adopted to a great extent in particular districts\*, it is by no means generally established.

The dairy people distinguish whey by two different names, that which separates easily from the curd, they call "green whey," and that which requires pressure to extract, they call "runnings, thrustings, or white whey." There are different methods of extracting the cream from whey. In some dairies the whole whey, when taken from the cheese-tub, is put into skeels

VOL. III.

K k

or

\* In Derbyshire more butter is made from whey than from the cream of milk, or from milk churned altogether.

or other vessels, where it remains for about twenty-four hours, when it is creamed, and the whey applied to the use of the calves, pigs, &c. The cream, when skimmed off the whey, is put into a brass pan and boiled, and afterwards set in jars, where it remains till a sufficient quantity for a churning be procured, which in large dairies happens generally once, but sometimes twice, a week.

The more common mode of management is considerably different from that above described. The green whey is put almost immediately from the cheese-tub into the furnace-pan, where it is scalded. When it acquires the proper degree of scalding-heat, cold water, or some white whey, is occasionally put in; this causes the whey to break, and throw up a thick white sort of scum, somewhat resembling cream, which the dairy-maid keeps constantly skimming off as it rises, and which she puts into cream jugs or jars, where it remains till the usual time of churning. In the dairies where the green whey is scalded, the runnings, except a little that is kept for the purpose of forcing the green whey, when scalding, to throw up the cream, is usually set in skeels or jars, in the same manner as the milk from the cows; and the cream, when taken off, being added to that procured by scalding, is churned in the ordinary way.

The quantity of butter procured from whey, it would appear, is considerable, not less in two instances, where particular attention was bestowed to ascertain the fact\*, than about an ounce and a half from the gallon. In regard to the quality, it is unquestionably inferior to that of butter made from the cream of milk, or from the milk and cream churned together, but not to such a degree as stated by Mr Marshall in his Rural Oeconomy of Gloucestershire, viz. one third; at least in the Report of the county of Leicester, it is mentioned, that "whey-butter" sells for 9 d. *per* pound, when other butter sells "from 10 d. to 11 d.;" and there it is also added, that "*eighteen cows will make about 17 lbs. (16 oz. each) of whey-butter per week;*"—a circumstance that certainly merits the attention of those who are in the practice of making either one-meal or two-meal cheeses.

## S E C-

\* See Mr Johnston's Account of Whey-Butter, published in the Appendix to the new edition of the Agricultural Report of Mid-Lothian, p. 60.



## SECTION IV.

*Dairy Management where Gheese only is made.*

ALTHOUGH in most of the dairies in England, where one-meal cheeses are made, the practice of making whey-butter is also common, yet it was judged most proper to allot a separate section to the description of the best methods of making one-meal cheese; and on that account the process of making whey-butter was included in the preceding part of the chapter.

Gloucester, Chester, Wilts, and Somerset \*, are the counties in Great Britain most noted for cheese of superior quality. Large quantities are annually sent from Derby, Suffolk, and some other counties, to London, and the large trading and manufacturing towns; but in respect of character, and of general quality, the cheese made in every other part of the island is greatly inferior to that in any of the counties first above mentioned. As to Scotch dairy-husbandry in general,

\* In the parish of Cheddar, in the county of Somerset, the largest cheeses in England are made. Some single cheeses made there, and which are known by the name of Cheddar cheese, weigh from one hundred and a half to two hundred weight each.

general, enough has been already said. In regard to cheese, in particular, it is only farther necessary to remark, that probably four-fifths of the cheese used at the tables of the higher and middle ranks, and in all the taverns in that country, is the produce of English dairies.

In describing the best methods of making one-meal cheese, or what is nearly the same, of making cheese from milk, whence none of the cream has been previously extracted, it is meant to keep chiefly in view that most generally adopted in Cheshire. In cheese-making, as well as in every other branch of rural œconomy, variations in management are discernible, not only in the general practice of an extensive district, but frequently in that of the same parish or lordship. Those that appear of importance shall be pointed out in a manner the best calculated to enable the reader to form a correct opinion in regard to the best method to be adopted in all such cases.

The following particulars will be found to merit every farmer's attention, who enters on the management of a cheese-making dairy :

The best season for making cheese.

— Milking.

— Milk.

— Colouring.

— Rennet.

The

The Breaking and gathering the curd.

—— Management of cheese in the cheese-press.

—— Method of salting cheese.

—— Management in the cheese-room.

*The best Season for making Cheese*, is during those months when the cows can be fed on the pastures, that is from the beginning of May till towards the end of September, or in favourable seasons the middle of October. On many of the larger dairy farms, in several districts, cheese is frequently made throughout the year, but that made during the winter months is considerably inferior in quality, and much longer of becoming fit for sale, or for use, than what is made within the periods above mentioned.

*Milking*.—The ordinary time of milking, in Cheshire, during the summer season, is six o'clock both morning and evening, and in winter at daylight in the morning, and immediately before dark in the evening. In other districts, as Wilts, Suffolk, &c. the people are frequently employed in milking by four o'clock in the morning in summer, and the business in a dairy of forty or fifty cows nearly completed, before the usual period at which it commences in Cheshire. This last is certainly the preferable practice, as when the cows are brought home to the fold, or farm-yard, which always happens where the pastures are



are within a reasonable distance, and milked unfettered, which is also commonly the case, the milking ought to be over before the heat increase so much as to make the cows restless and unruly.

One woman is considered able to milk ten cows, and that number is usually assigned to each. A man, either the farmer himself, or some careful person, attends the milking of the cows, for the double purpose of superintending the due performance of the work, and of carrying the milk in large buckets, (into which it had been occasionally emptied from the milking-pails), from the fold to the dairy, where it is poured through a strainer into the cheese-tub, preparatory to applying the rennet. In all well managed dairies, particular attention is paid to the thoroughly milking of the cows: when this is omitted the cows are apt to go dry. Besides, every person knows, that the last of a milking is very greatly superior in quality to what is first drawn.

*Milk.*—On the quality of the milk, unquestionably depends, with ordinary management, the goodness of the cheese. The terms one-meal and two-meal cheeses have already been defined. If none of the cream of the preceding night's milk be abstracted, but made to incorporate with the milk of both milkings united, by the process formerly described, it does not occur

to

to the writer, that the quality of the cheese made from the milk of last night, and that of this morning mixed together, can be in any material degree debased. But not only in the dairies in Cheshire, but in every dairy where two-meal cheeses are made, a certain portion of the cream is withheld.

In regard to that degree of temperature which milk ought to possess, so as to be in the best possible condition for applying the rennet, all is dark and uncertain. In this branch of the business general rules are not attended to, nor can they become in any material degree useful, as a guide to direct the conduct of an unexperienced cheese-maker, as the practice of almost every particular dairy differs from that of another. That adopted in Cheshire, although extremely indefinite, seems as a general rule worthy of consideration, namely, that the lowest degree of heat which milk ought to possess when the rennet is applied, is one-half of that of milk from the cow; the highest, about twice the natural warmth. From this it may be inferred, that by the time a large dairy of cows can be milked, and the milk put together for the purpose of artificial coagulation, the dairy-maid will not err materially by applying the rennet immediately afterwards. This rule is however very uncertain, and liable to exception, on account of the variation in the seasons, and the frequent and  
great

great changes that take place in the state of the weather in the same season. Accordingly, in all dairies remarkable for cheese of a superior quality, the heat of the milk, before the rennet be applied, is raised or lowered by the addition of warm milk or of cold water, to that degree which, in the practice of the particular dairy, is found from experience the most eligible.

It is surprising that in large dairies the use of the thermometer is not as well known as that of the skimming-dish. To ascertain with precision, by a course of well conducted experiments, the temperature most proper for milk to possess at the time the rennet is applied, could not fail to be greatly in favour of the quality of the cheese, and would in all probability tend to prevent the cracking, blistering, and hoving, which so frequently take place in cheese, in consequence of some mismanagement in the making.

An instrument, called a Lactometer, has been lately invented by a Mr Deas, mathematical-instrument-maker in Liverpool, which, if found, on experience, to answer the many useful purposes for which, in the Report of the State of Agriculture in the County of Lancaster, it is said to be calculated, must have the effect of throwing a great deal of light on the whole system of dairy husbandry, and must be the means, in time, of reducing the business of butter and cheese making, which is at present carried on



without any established rule by which the operator can be guided, to something like fixed invariable principles. This instrument is intended to ascertain the richness of milk, by its specific gravity compared with water, and by its degree of warmth, (taken by a standard thermometer), on comparing its specific quality with its warmth. By a scale constructed for this purpose, may, if the principle be right, be discovered, not only the comparative quality of the milk of different cows, but also of that produced in consequence of cows being maintained on different sorts of food, as pastures, hay, turnips, &c. The following are the instances, wherein it is said the lactometer may be useful.

In discovering what breed of cattle is most advantageous for milk,

What food in the winter-season, whether carrots, turnips, potatoes, hay, &c. is best for milch-cows.

What the effects of different pastures may be.

How far particular farms are best adapted for making butter or cheese.

How far the inconvenience of large cheeses, in some dairies, being too rich to mature or ripen properly may be prevented, by discovering when this redundancy of richness exists in the milk.

And

And lastly, In fixing a standard for the sale of this useful article according to its quality.

By the use of this instrument, together with the thermometer, and by discovering a mean whereby to ascertain the strength and quality of the rennet, and what is necessary to be used for coagulating a given quantity of milk, the management of a dairy, where cheese is made, would be greatly improved; especially if, by various experiments made by expert chymists, the facts necessary to be ascertained were established.

*Colouring.*—The colouring of cheese has been so long common in the cheese districts, that it is probable cheese of the best quality would be in a great measure unsaleable, if it did not possess the requisite colour. The degree of colour is regulated chiefly by the name under which it is intended the cheese should be sold, as Gloucester, Cheshire, &c. The introduction of this practice was no doubt a species of fraud, as it was intended to convey an idea of richness which the cheese did not really possess. This is the more evident, as it is universally allowed, that the leanest cheese always requires the greatest quantity of dye to bring it to the proper degree of colour. The colouring of cheese is, however, now so common, that an intention of fraud cannot, with propriety, be ascribed to those who adopt the practice.

The

The stuff formerly mentioned as being used for a similar purpose in the butter-dairies, viz. Spanish arnetta, is the common dye used for cheese. The weight of a guinea and a half of real Spanish arnetta is considered in Cheshire sufficient for a cheese of 60 lb.; and in Gloucestershire an ounce is the common allowance to the hundred weight.

There are different ways of preparing the arnetta, as well as of applying it. The method used in Cheshire is, when the dye is wanted in the morning, to tie up the necessary quantity of pounded arnetta in a linen rag, and to put it into about half a pint of hot water in the evening. In the morning, immediately before applying the rennet, the infusion of arnetta is poured into the milk, and the mixture is then well stirred about, so as to make the milk and the dye incorporate intimately together. In other districts, it is common to rub a piece of unpounded arnetta, after having been previously dipped in milk, on a smooth stone, in the same manner that paint is ground. The colouring thus obtained is mixed with the milk in the cheese-tub, in the manner and at the period before mentioned, care being taken to prevent any of the unreduced particles of arnetta from falling into the cheese-tub.

*Rennet.*—Milk may be coagulated, or turned into a curdled state, by the application of any  
sort



fort of acid. That which is most commonly used, is the maws or stomachs of young calves prepared for the purpose. These are denominated Rennets; but in England they are provincially called Vells, and in Scotland Yearnings. When the maws, which usually contain a curdled kind of substance, are purchased from the butcher, they are opened, and the curd, or thick substance taken out; this having been repeatedly washed in cold water as well as the bag, it is again replaced, with a considerable addition of salt, and then packed in a jar, into which is poured a very strong brine of salt and water. In many instances, the maws are allowed to remain in this state for about twelve months before using; in others, after having remained some time covered with the brine, they are taken out, and an additional quantity of salt being applied, they are hung up in the dairy, or some other convenient place to dry, and remain in that state till wanted for use.

The impropriety of using small pieces of vell, that had been previously pickled and dried in the manner last mentioned, as coagulum, after infusing them over night in a little warm water, although a common practice even in Cheshire, appears so evidently improper, that it is surprising it should be anywhere continued. The methods of curing, when each vell is cured separately, and the coagulating powers which one may

may possess beyond another, are so different, that when an inch or two of a particular vell is depended upon for effecting the purpose, the dairy-maid must remain constantly in a state of suspense, nor is it possible that with all her attention the proper quantity can be in common applied. Whether the vells necessary for a season are kept in brine, or pickled and afterwards dried, the best method of preparing the rennet for use, because attended with the greatest degree of certainty in regard to its being of equal strength and quality, is to extract the substance from the whole at once. This is frequently done in Cheshire; but the writer believes nowhere else in Great Britain; the only way in the other cheese-districts being to use rennet extracted from one or two vells only. The best mode of preparing rennet adopted in Cheshire, is to put the vells into an open vessel, and to pour in two or three pints of spring-water for each, according to the number. In this state they are allowed to stand about twenty-four hours. The vells are then taken out, and put into other vessels, with about half the quantity of water. They are then allowed to remain for a like period, when being taken out and thrown aside, as no longer of use, and the first and second infusion being mixed together, and strained through a sieve into a jar or other vessel, a considerable quantity of salt is added. This liquor is then  
fit

fit for use, and requires no after management beyond that of taking off the scum that usually rises to the top, and of adding a little salt when that already in the jar is nearly dissolved. About half a pint of this preparation, wine measure, is sufficient for coagulating that quantity of milk which will make sixty pounds of cheese.

No general rule having yet been established, whereby to determine either the quantity of rennet to be applied, or the proper temperature of the milk at the period of application, it can only be stated, that each dairy-maid is obliged to exercise her own discretion, according to the existing circumstances, in regulating her conduct in this respect. But although practice is the only means by which she can acquire a proper knowledge of this branch of the business, yet the consequences of proper or improper conduct are well known in every cheese-dairy. When the coagulation is accelerated or retarded beyond the proper time, (which in making a 60 lb. cheese is reckoned an hour and a half), either by giving too much or too little rennet, or by applying it when the milk is too hot or too cold, not only the quantity of the curd is diminished, but the quality in either case materially affected. In the former case, it is of a tough gluey texture; in the latter, too tender. After the rennet has been applied, the milk-tub is covered up by a board, over which is laid a  
linen



linen cloth; and having stood the usual time, the dairy-maid, on finding that the coagulation is completed, sets to work, with her assistants, to separate the curd from the whey, and which is generally called

*Breaking and gathering the Curd.*—Simple as the business of breaking the curd may appear, and uniform as one would expect the method to be, yet there are few particulars in the whole art of cheese-making wherein so great difference is observable in practice. In some dairies, the curd is at first broken or cut in various directions with a cheese-knife, an instrument made for the purpose, and used with a view of making the whey separate easily, and without carrying off with it any richness from the curd. After these first incisions, some time is allowed for the broken curd to subside. The knife is then again used, and more freely than before; and while the dairy-maid stirs up the unbroken curd from the bottom with the skimming-dish in one hand, she cuts the larger pieces of curd with the knife, which she holds in the other. Having thus thoroughly broken the curd, and allowed some time for its subsiding, she then begins to take off the whey with the skimming-dish. In other dairies, not less celebrated for good cheese, the skimming-dish only is used in breaking the curd; and in order to facilitate the operation of separating the whey from the

curd,

curd, some of the whey that first rises to the top is skimmed off, and being either heated or cooled, according to the state of the weather, and the required consistence of the curd, is again returned into the cheese-tub, and after remaining a little time, the whole is laded off in the usual manner.

All the whey that can be extracted without pressure having been removed, and the cheese-tub being raised at one side, the curd is collected into a mass, and at first pressed with the back of the skimming-dish. When no more whey can be discharged by this means, others more violent are adopted; the curd is, in many cases, cut with the cheese-knife to give vent to the whey, and is then pressed as hard as possible with the hands; in others, a considerable weight is frequently applied.

The curd having been in a great measure separated from the whey, it is put into two or three pans, or other vessels, and the dairy-maid and her assistants break it with their hands as fine as possible; in the course of doing which, a proper quantity of salt, (for the weight or measure is scarcely in any instance ascertained), is scattered over the curd and intimately mixed therewith\*. When it is properly broken, rub-

VOL. III.

M m

bed

\* According to the method usually practised in Gloucestershire, when the curd is broken to the requisite fineness,

bed and salted, a cloth is spread over the cheese-vat, in Scotland called the Cheffel, and the broken curd being packed into it, and covered up with the cloth, a board is laid over the vat, and a weight, great in proportion to the quantity of curd, placed upon it, by which means the remaining whey is pressed out. Where the cheeses usually made are of a large size, as in Cheshire, the dairy-maid thrusts a number of iron skewers (through holes made in the side of the vat, for the purpose,) into the curd in various directions. These being withdrawn, the openings made by them serve as so many drains for permitting the whey to run off. When the whey, in place of running freely, which it does at first, only falls in drops, the weight is removed, and the curd rebroken, and being again put into the vat, is managed in the manner now described, and repeated while, by using such means, a drop of whey can be extracted. The curd being now almost

finest, it is again returned into the cheese-tub, when it is scalded, by pouring over the broken curd a pailful of hot water, or of whey, or of whey and water mixed. After the scalding water or whey is applied, the whole is briskly stirred, and being allowed to stand for some time for the curd to settle at the bottom of the tub, the scalding materials are skimmed or poured off, and the curd being pressed as before, so that no more whey can be extracted by such means as were formerly used, it is put into the vat, and pressed in the ordinary way.



most entirely freed from the whey, is again placed in the vat, a clean cloth having been previously spread for the purpose of receiving and inclosing it. The curd now takes the form at least of cheese, and the cover of the vat being laid on, it is placed in the cheese-press.

*Management of Cheese in the Cheese-Press.—*

When the vat is properly placed in the press, the ordinary degree of pressure is applied, which is more or less according to the sizes of the cheeses usually made. At all large dairies, there are two or three presses, all varying in respect to weight or pressure. As soon as the vat is placed in the press, and the weight applied, skewers are again thrust in through the holes in the side of the vat; this is done repeatedly during the first day the vat is in the press. From the time the vat is first placed in the press, till it is again taken out, does not, in ordinary cases, exceed two or three hours. When taken out, the cheese is put into a vessel with hot whey, with a view of hardening its coat or skin, where it stands for an hour or two; it is then taken out, wiped dry, and after having remained some time to cool, it is covered with a clean dry cloth, and the vat being wiped dry, and the cheese replaced, it is again put into the press. In the evening, supposing the cheese to have been made in the morning, which is the usual time, it is again taken out of the vat, and another dry cloth

cloth being applied, it is turned and replaced, what was formerly the upper becoming now the under side. In this manner, it is taken out, wrapped in clean cloths, and turned in the vat twice a-day, for two days, when it is finally removed.

*The Method of salting Cheese,*—Is the next particular of management in the order of description. The cheese, on being for the last time taken out of the vat, is carried to the salting house, and placed in the vat in a tub filled to a considerable depth with brine, in which it stands for several days, being regularly turned once at least every day. The vat is then removed from the brine-tub, and the cheese being taken out, is placed on the salting bench, where it stands for eight or ten days, salt being carefully rubbed over the whole every day during that period. When the cheese is of a large size, it is commonly surrounded with a wooden hoop, or fillet of cloth, to prevent renting. After it is supposed to be sufficiently salted, it is washed in warm water or whey, and when well dried with a cloth, is placed on what is called the drying bench, where it remains a like period before it is removed to the keeping house or cheese chamber. In some dairies, the new cheeses are not put in brine, but kept in the vats on the salting benches; and after being rubbed with salt, and turned in the vats daily for a week

week or ten days, the vats are removed, and the cheeses managed in the manner above mentioned. In several other dairies, again, the cheeses are salted while the operation of pressing is performing. At every time they are taken out of the press for the purpose of being turned in the vats, they are well rubbed with salt, which for small thin cheeses, such as are commonly made in Wilts and Gloucester shires, is found to be sufficient; and therefore, when taken for the last time from the press, in place of any more salt being applied, they are set at once on the drying benches. In short, the practice of immersing new made cheese in brine is only adopted when they are of so large a size, that rubbing salt on the outside would not be sufficient for answering the intended purpose.

*Management in the Cheese-room.*—When the cheeses are properly salted, and have acquired a competent degree of dryness, they are carried from the salting place to the cheese-room, or store-house; where, after being smeared with fresh-butter, they are laid on the floor, or on shelves erected for the purpose. For the first ten days or a fortnight after they are placed in the store-room, they are pretty smartly rubbed every day, and the smearing with butter repeated; and although after that period it is only necessary to rub them two or three times a-week, yet they should be turned every day while in the  
the



the dairy-man's possession, which is longer or shorter according to the season of the year, and the demand at the principal markets.

The produce of a dairy of cows where the milk is converted into cheese, is very variously stated. In some districts, two hundred weight and a half from each cow, whether a good or bad milker, if at all in milk, is considered a good return. In others, the average runs as high as three; and in the county of Wilts in particular, from three and a half to four is the usual quantity.

From accurate calculations made by Mr Marshall, and these several times repeated, he found, that in Gloucestershire about fifteen gallons of milk were requisite for making little more than eleven pounds of two-meal cheese, and that one gallon of new milk produced a pound of curd.

It is the general opinion of dairy-farmers, that the produce of from two and a half to three and a half acres, is necessary to maintain a cow all the year round. Taking, therefore, the medium of the three averages of cheese above mentioned, (amounting to 355 lb. from each cow), the quantity of cheese by the acre is 118 lb. Every calculation of this kind, must be admitted to be extremely vague and uncertain. The correctness of the one now stated is, however, to a considerable degree, confirmed by Sir William Petty's statement, in regard to the quantity of  
milk

milk which he supposed the cows in Ireland yielded in the year \*, *viz.* for ninety days three gallons, for other ninety days one gallon, for the next ninety days a quarter of a gallon; and for the remainder of the year none; making in all three hundred and eighty-four gallons; which, considering that in every dairy a certain share of cream is abstracted before the milk is put into the cheese-tub, may be supposed, when converted into one meal, or two-meal cheese, to make little more or less than 355 lb. as above stated.

In addition to the preceding account, which, it is believed, is a pretty accurate statement of the method adopted for making cheese in some of the best managed dairies in the island, the reader will not be displeased to find subjoined directions for making two sorts of cheese not common, *viz.* Parmesan and Stilton; the one in great repute over Europe in general, and the other in Great Britain in particular.

DESCRIPTION of the Method of making  
PARMESAN CHEESE, as practised by SIGNIOR  
MOSCHATE, near Milan in Italy.

“ At ten o'clock in the morning, five brents and  
“ a half of milk, each brent about forty-eight  
“ quarts,

\* Sir William Petty's Political Anatomy of Ireland,  
p. 51, and 52.

“quarts, was put into a large copper, which  
 “turned on a crane, over a slow wood fire, made  
 “about two feet below the surface of the ground;  
 “the milk was stirred from time to time; and  
 “about eleven o’clock, when just luke warm, or  
 “considerably under a blood-heat, a ball of ren-  
 “net as big as a large walnut, was squeezed  
 “through a cloth into the milk, which was kept  
 “stirring. By the help of the crane the copper  
 “was turned from over the fire, and let stand  
 “till a few minutes past twelve; at which time  
 “the rennet had sufficiently operated. It was  
 “now stirred up and left to stand a short time.  
 “Part of the whey was then taken out, and the  
 “copper again turned over a fire sufficiently  
 “brisk to give a strongish heat, but below that  
 “of boiling. A quarter of an ounce of saffern  
 “was put in to give it a little colour; but not  
 “so unnaturally high as some cheeses in Eng-  
 “land are coloured; and it was well stirred from  
 “time to time. The dairy-man frequently felt  
 “the curd. When the small, and as it were the  
 “granulated parts felt rather firm, which was in  
 “about an hour and a half, the copper was ta-  
 “ken from the fire, and the curd left to fall  
 “to the bottom. Part of the whey was taken  
 “out and the curd brought up in a coarse cloth,  
 “hanging together in a tough state.

“It was put into an hoop, and about an half  
 “hundred weight laid upon it for about an  
 “hour;

“ho  
 “an  
 “ho  
 “da  
 “fa  
 “fo  
 “at  
 “ne  
 “in  
 “be  
 “  
 “an  
 “wa

T  
 nam  
 in ve  
 delc  
 Melt  
 Still  
 circu  
 an i  
 chee  
 great

• B

† S  
 parish  
 ferent  
 fields i

V



"hour; after which the cloth was taken off, and the cheese placed on a shelf in the same hoop. At the end of two, or from that to three days, it is sprinkled all over with salt; the same is repeated every second day for about forty or forty-five days, after which no further attention is required. Whilst salting, they generally place two cheeses, one upon another; in which state they are said to take the salt better than singly.

"The whey is again turned into the copper, and a second sort of cheese is made, and afterwards even a third \*."

The cream-cheese, so generally known by the name of Stilton †, is made in Leicestershire, and in very considerable quantities. Cheeses of this description were first made by a Mrs Paulet, near Melton-Mowbray. They acquired the name of Stilton cheese, from the following incidental circumstance. A brother of Mrs. Paulet kept an inn at Stilton, whom she supplied with cheese. Stilton, from being situated on the great north road from London to Edinburgh, is

\* Bath Society Letters and Papers, Vol. vii. p. 63.

† Stilton is a small village in Huntingdonshire. The parish is in the open-field state; the soil of a very indifferent quality; and neither the tillage nor the pasture fields in such order, as to merit commendation.

of course a very great thoroughfare; and this landlord's cheese being superior to any that his guests ever tasted before, scarcely a traveller with money in his pocket passed through, that did not purchase one or two. The character of this sort of cheese having been by this means generally established, and Stilton being for a long time the only market at which they could be purchased, they became known by the name of Stilton cheese.—The following is the method of making them, as practised in Leicestershire, and as described in the Agricultural Report of that county :

“ Take the night's cream and put it to the morning's new milk with the rennet; when the curd is come, it is not to be broke, as is done with other cheeses; but take it out with a toll-dish altogether, and place it in a sieve to drain gradually, and as it drains keep gradually pressing it, till it become firm and dry; then place it in a wooden hoop; afterwards to be kept dry on boards, turned frequently, with cloth binders round it, which are to be tightened as occasion requires.”

SEC.

## SECTION V.

*General Observations on Dairy-Husbandry; the Methods of feeding Cows, &c.*

WHICH of all the branches of dairy-husbandry above described, are upon the whole most profitable, is of little moment to have determined. Some of them can only be carried on with advantage, where the situation of the farm is peculiarly favourable in regard to market; while the others, (if the butter be salted, and become an article of commerce, as it generally does), may be established in any county in the island.

Which of the two great branches, butter or cheese, when the dairies are under similar good management, returns most profit to the farmer, seems, upon the whole, a very doubtful point. The valuable part of the milk is in either case completely extracted; but although the produce sells at very different prices, the value as stated in the appendix to the Agricultural Report of Mid-Lothian, is very much on a par, amounting, whether of butter and butter-milk, or of cheese and whey, to very nearly fourpence halfpenny for the gallon of milk. This, at Sir William Petty's calculation of the average quantity of a cow's milk by the year, as before stated, makes



makes the gross value of the milk of an ordinary cow, when managed in a proper manner, amount to L. 7, 4s. *per annum*; a sum which, as a general medium, the writer, from various calculations, is satisfied, is neither greatly above nor below what ought to be stated.

The number of cows kept on farms of an ordinary size in England, where butter and cheese are made for sale, that is, on such as may be properly denominated dairy-farms, is from twenty to thirty, or forty. On dairy-farms called large, the number increases from upwards of forty or fifty to above a hundred; and there is an instance or two in Somersetshire, where it amounts to two hundred.

When such numbers as these are mentioned, dairy-husbandry, as practised in Scotland, sinks into insignificance; there being comparatively very few instances where above ten or twelve cows, that are useful for the dairy, are to be found in the possession of a farmer in that kingdom.

Why so many districts in England should be remarkable for making good cheese, and that there is only one in Scotland in any degree noted for excellency in that art, may to some appear remarkable. The Scotch farmers, it is well known, are not deficient in general knowledge, nor in enterprize; nor are the pastures in that country so much inferior to those in England, where the best cheeses are made, as to create

create such a difference in the quality. The richest pastures, in England, are not the best on which to establish cheese-dairies. On the contrary, it is universally acknowledged, that the best cheese is in common made from poor, cold, wet, and comparatively unproductive lands.

That Being the case, it might be difficult to account for the almost total neglect of the establishment of dairies for making cheese in Scotland, were it not known, that the demand for that article is not in that country so considerable, as to induce farmers of opulence and skill to devote their attention to that object.

The peasantry and labouring people, although they live in general much better than they did formerly, have not as yet, like that class of people in England, got into the use of cheese as a general article of food; till that happen, the demand can never become considerable; and without a demand, it is in vain to suppose that farmers will give up such branches of husbandry as afford them suitable returns for their labour and expence, for others which, under the existing circumstances, cannot possibly be rendered so productive.

The management of a dairy, it will readily be inferred from the preceding account, is a business in which no person ought to engage, who is not capable of bestowing the most minute

nate attention to every particular connected therewith ; as without that becomes a fixed and established principle in the farmer's mind, the chance that success will attend the undertaking is at best but precarious and uncertain.

Besides the particulars necessary to be attended to in the management of a dairy, and which have already been taken notice of in the course of the preceding detail, some others, in regard especially to the management of the cows, naturally fall under consideration. These, however, may be shortly stated.

If, as there is every reason to believe, the cows that give the greatest quantity of milk are not always the most profitable for the dairy, it ought to become more the study of the dairy-man to purchase cows famous for the quality rather than the quantity of milk they yield. If the milk of a cow that gives six gallons in the day produce as much butter or cheese as that of another which gives eight, it is evident, as hinted before, that the gross value is the same, while the fourth of the labour, a material article, is saved.

It is of great consequence to the produce of a dairy, that the cows should not drop their calves too early in the season. When that happens, they fall off in the quantity of milk at the period (autumn) when, owing to its superior richness, it is more valuable than at any other. From  
the



the end of March to the end of April, is the best time that a cow can drop her calf; she soon gets into good condition on the early grass, and will yield a greater quantity of milk in the course of the season, than those that calve either considerably earlier or later.

In the management of cows in summer, there is a fameness everywhere prevalent. They are kept on the oldest pastures on the farm. When these are at a distance from the farm-houses, they are milked on the pastures; but otherwise they are brought home morning and evening for that purpose. In winter the dry cows, that is, such as do not give milk, are fed on straw in the straw-yard; while those that are in milk, or are near calving, are kept in some inclosed pasture, or in sheds erected for the purpose, and maintained chiefly on hay. Where turnips, cabbages or potatoes, are cultivated on a large scale, the milch-cows have a daily and regular allowance of one or other of these sorts of food during the winter and spring months. Potatoes in particular, are admirable food for cows; as, while they tend to keep them in good condition, the quantity of milk is generally abundant and of good quality, both in respect to richness and flavour.

In short, the dairy-farmer, in every part of the island, will find it for his interest to be attentive to  
feeding

feeding his cows, especially those that are in milk; for, according to an old Scotch saying, "Cows give milk by their heads;" or in other words, if the best cows be stinted in their food, or otherwise mismanaged, the quantity of milk will soon decrease.

In the management of cows in summer, there is a balance ever to be preserved. They are kept on the oldest pastures on the farm. When they are at a distance from the farm houses, they are milked on the pastures; but otherwise they are brought home morning and evening for that purpose. In winter the dry cows that are in milk are not sent to the pastures, but are kept in the straw-yard; while those that are in milk or are near calving, are kept in some inclosed pasture, or in the stable for the purpose, and mainly on hay. Where turnips, cabbages, or other vegetables are cultivated on a large scale, the milch-cows have a daily and regular allowance of one or other of these sorts of food during the winter and spring months. Potatoes in particular are admirable food for cows; and while they tend to keep them in good condition, the quantity of milk is generally abundant and of good quality, both in respect to richness and flavour. In short, the dairy farmer, in every part of the island, will find it well to be attentive to feeding

Rem  
pr  
"V  
"sp  
"if  
"in  
"an  
mer,  
mean  
from  
ful p  
be de  
state.  
Be  
lowed  
means  
be m  
can a  
in ag  
in Vol  
sion

## CHAPTER XXIII.

*Removing Obstacles to the Introduction of Improved Cultivation, as Stones, Furze, Broom, &c.*

**W**E may talk what we please," says Cowley, "of titles and lions rampant, and spread eagles in fields d'or or d'argent: But if heraldry were guided by reason, a plough in a field arable would be the most noble and ancient arms." Were that the case, the farmer, who by inclosing, draining, and other means, had converted the greatest extent of land from a waste and unproductive state, to the useful purposes of cultivation and pasturage, would be deemed entitled to the highest honours of the state.

Be that as it may, it will be universally allowed, that by inclosing and draining, and means such as these, the real riches of a state can be most effectually increased. By these only can a solid foundation be laid for improvements in agriculture, and the breeds of the different



species of live-stock ; for the establishment of manufactures and commerce ; and for the support of an increased population. That man, therefore, who is aiding in effecting these great national improvements, will be considered by the cool and dispassionate reasoner, as a more useful and valuable member of the community, than him who conquers and who desolates provinces.

Had not the lands of these kingdoms been partially inclosed, drained and improved, what at this day would have been the state of agriculture, manufactures, commerce and population? The anxious inquirer in either kingdom may satisfy himself, without being obliged to have recourse to the inhabitants of the other for information. Let the Englishman ascertain the extent and value of the produce of an inclosed parish, beyond that of one similar in soil and situation, cultivated in the open-field state ; and let the Scotchman examine to what degree the general management of a well improved farm exceeds, in respect to national, as well as private emolument, one where the ancient system of infield and outfield remains established ; having done so, they may respectively form some idea of the advantages that have resulted from so many intelligent men in the former, as well as in the present times, having devoted their time, their capital, and their attention, to the improvement of the soil. Then, also, they will be satisfied, how much it is the indispensable

dispensable duty of the executive governments of this, and of every other country, to encourage, as far as in their power, the use of such means as are best calculated to lay that only foundation (improved agriculture) on which the superstructure of manufactures, commerce, and increased population, can be erected with propriety.

Practical experience is beyond all doubt the best teacher; but it does not thence follow, that a farmer, who is about to undertake the improvement of a farm, cannot acquire useful information from the communications of others. Although the knowledge which he derives in consequence of practice must be more useful to himself than to others, in so far as it is of a local nature; yet the advantage which a farmer possesses, who is acquainted with the practice of other districts, over him, who, because he knows no better, continues to trudge in the old beaten track of his forefathers, must at once be obvious. Could it be supposed, that the perusal of a detailed account of the practice of particular individuals, who had acquired reputation, in consequence of the great success attending their various operations of draining, inclosing, &c. would not be beneficial to others; it would follow, that every improving farmer must chalk out a line of conduct for himself; the expence, labour, and length of time necessary for improving an extensive farm being so great, that the instances  
are

are rare, where the same person engages more than once in undertakings of this nature.

Few men can of themselves, and from practice only, acquire that degree of knowledge, even in the course of a long life, which they may become possessed of by comparing the practices of different districts. By doing this, they may, with a due attention to the particular circumstances in which they are individually placed, respecting soil, climate, &c. form a rule whereby, on more established principles, to regulate their own. It was formerly hinted, how much it would be in favour of the agriculture of these kingdoms, were the more useful practices of particular districts made generally known in others. Nothing would so effectually do away the rooted prejudice in favour of ancient customs, so prevalent, especially among the middling and lower ranks of farmers;—a prejudice fostered by ignorance, and which can only be removed by such an increase of knowledge, that while the mind shall be better enabled to judge, it will also be led naturally to decide with more impartiality, in consequence of its becoming gradually less fettered by the predilection, which in its state of ignorance it possessed, for what it was habituated to consider practices superior to every other.

Considering the means by which lands may be improved as one of the most important subjects connected with agriculture, and being fully



ly satisfied, that farmers in particular districts may derive great advantage from a knowledge of the practices adopted in others, the writer shall, use his endeavours to describe, as perspicuously as possible, the benefit that may be expected to result from adopting all or any of the means of improvement above suggested. He shall also point out minutely the different ways in which lands are inclosed, drained, flooded, &c. in these kingdoms; so that the unexperienced farmer, it is hoped, will be enabled to derive some information from a perusal of the following pages.

Lands that have been long imperfectly cultivated, are often not only encumbered with weeds, but frequently with stones, furze, &c. which require to be removed, before new and better methods of management can be adopted with success. Before a field can be inclosed and drained, the ridges straightened and levelled, and the soil well cultivated, and completely freed from weeds, the improving farmer will find it necessary to remove the large stones, and the bushes of furze, broom, brambles, &c. where they abound, in order to give full effect to the operations of the plough and the harrow, and of course these objects will first attract his attention.

Of these impediments to good cultivation, large stones, when partly or wholly covered by the soil, but not to such a depth as to allow the  
plough

plough to pass over them, are the most difficult and expensive to remove. When these abound, which is frequently the case in elevated districts, particularly in the Highlands of Scotland\*, the expence of improving a farm is greatly augmented, and the undertaking becomes no less tedious than troublesome.

The usual method of clearing land of large stones, is by boring, and afterwards blowing them to pieces by means of gunpowder. These operations are performed by people who are bred to the business, and who contract at a certain rate *per* inch, according to the nature and hardness of the stone, and whether the gunpowder be furnished by the employer or the operator. A penny the inch is the common price when the employer furnishes the gunpowder. The bore, which is about an inch in diameter, and from six to ten or sixteen in depth, in proportion to the size of the stone, is made by striking an iron rod, called a jumper, with a hammer, against one particular

\* In the Highland parts of the counties of Perth and Aberdeen, where the teams are weak, and the farmers more remarkable in general for indolence than activity, it is the common practice for the plough-boy to take hold of the horses bridles or halters, and, walking backwards, to guide the plough round the large stones. This he does with as much care and studied attention, as ever a pilot steered a vessel driven among rocks.

particular part of the stone, whereby a certain portion of it is levigated, or reduced to a powdery substance, at every stroke; and by applying now and then a small quantity of water, the operation is greatly facilitated. The bore having been made to the supposed requisite depth, the borer, after having taken out all the powdery substance, fills the bore to a certain depth with gunpowder; and having put down a small iron rod, which being afterwards withdrawn, leaves an opening that answers the purpose of a touch-hole, he fills the remaining part of the bore with chips of stone, which he rams in as hard as possible with the rod and hammer. The small iron rod being then withdrawn, and gunpowder poured into the hole, and a little spread on the top, he places a piece of match in such a position, as when nearly burnt out will set fire to the powder on the top; and having lighted it, he makes his escape to a proper distance before the explosion take place.

The stone, which by this means is made easily portable, is chiefly used, when there are great numbers on a field, in building fences, and the smaller pieces in forming drains. When thus applied, although the expence is much greater than that attending the ordinary mode of quarrying stone, yet, considering the double purpose that is answered, *viz.* clearing the field, and furnishing materials for inclosing and draining it



at the same time, it does not occur, that any other better, or less expensive method could be adopted for clearing a field of these incumbrances. It frequently, however, happens, that the removal of large stones is necessary, while none of the other purposes can be answered thereby. In such cases, the expence of clearing a field becomes much more considerable. To farmers so situated, it may not be improper to recommend a machine mentioned, although not accurately described, in the Scots Farmer, Vol. i. p. 197. which, if used, would on many occasions save both the tedious labour of boring, and the expence of gunpowder: It is nothing else than applying the lever, the use of which, in moving dead weights, is pretty well known to every common mechanic and labourer. The lever is supported by three posts set in a triangular form, in the manner used for hanging a balance or steelyard, when hay or other bulky articles are weighed. Ropes or chains being put round the stone, and afterwards made fast by a hook to one end of the lever, the strength of two or three men is applied to the other. The stone being by this means suspended, the sledge or carriage is drawn under it, when it is lowered and placed on the carriage with great ease and expedition. The simplicity of this contrivance cannot be exceeded; and as it must necessarily prove effectual in a great many cases, it merits the improving

ing farmer's attention. The writer has on many occasions seen five or six men employed for an hour or two in carting a large unwieldy stone, which, had the lever been applied in the manner above mentioned, might have been done in much shorter time, and with fewer hands. There is still another method used in various parts of both kingdoms for removing large stones, when they are so situated as to obstruct the plough; that is, by digging pits and sinking them. This is so slovenly a way of doing the business, as ought not to be recommended. Besides the expence, which is considerable, it is also often attended with another bad consequence, that of mixing the soil with perhaps the worst sort of subsoil, by which the quality of the former is greatly injured.

Furze, broom, brambles, &c. are shrubs that grow naturally on almost all the unimproved lands in these kingdoms, and to such a degree, in many places, as renders it very troublesome and expensive to extirpate them. The common method is to grub them up with the hoe or mattock. This is done with more or less attention, according to the means intended to be afterwards used for reducing the lands to a proper state of cultivation. When it is proposed to fallow the field, the largest of the roots only are grubbed up; and when that is done, it is ploughed with a plough drawn by four or six

strong oxen or horses. The greatest part of the remaining roots are torn up by the first ploughing, and the business completely effected by cross-ploughing the field on the next occasion. The furze, broom, &c. are commonly carried off for fuel; and the small roots being collected together in heaps, are consumed to ashes on the field.

In many parts of England, the usual means adopted for bringing waste, or hitherto uncultivated lands into tillage, is by paring and burning the sod. Where these shrubs grow on commons, or wastes that are proposed to be improved in this way, the roots must be grubbed up with more attention than is necessary in the former case, otherwise the paring spade cannot be used with effect.

In either case, when furze or broom are strong and close, and when they grow in a country where fuel is so plenty that they are unsaleable for that purpose, it would reduce the expence of grubbing, and greatly lessen the labourer's trouble, to set fire to them before hand; and as frost has a very great effect in withering these shrubs and in rendering them more combustible, the best season for burning them before grubbing is during a severe frost in winter.





## CHAPTER XXIV.

*The Various Methods of Inclosing adopted in Great Britain.*

**I**N England there are bars to inclosing which the Legislature only can remove, but which, being never in any case done, without loading the proprietors with an unmeaning useless expence, this species of improvement, important as it certainly is, goes on in many parts of that kingdom but very slowly. In Scotland, although every proprietor is at perfect freedom to inclose and improve his estate in the way which he considers likely to prove most beneficial, provided he do not thereby injure that of his neighbour; yet, in the northern division of the country, inclosing is less thought of, except on the farms possessed by the proprietors, than in any other part of the island.

The advantages resulting from inclosing are so great and numerous, and at the same time so evident, that it has been long matter of surprise to

free gentlemen, with the utmost eagerness, adding estate to estate, and field to field, while they could have expended their money to greater advantage, and with much better effect, in inclosing and improving those of which they were formerly possessed. From the conduct of many proprietors in Scotland, one would be apt to conclude, that not a well paid rent, or the improvement of the country, but extensive territory, was the object of their ambition. They seem not to have considered, that L. 1000 a-year paid from 1000 acres of well managed land, is a more certain revenue, and collected at less expence, than a like sum from three times the extent in an imperfect state of cultivation.

Among the advantages derived from inclosing, that of ascertaining and securing the extent of the property is not the least considerable. The many expensive, tedious, and vexatious litigations that are frequently carried on in Scotland, with a view of determining the boundaries of an open-field estate; not to mention the numerous prevarications and perjuries that often take place, when the tenants of the one estate are brought forward to prove facts, which it is not for the interest of the landlords and tenants of the other to have established; might be almost sufficient to induce proprietors in that country to inclose their lands. But stronger reasons occur; inclosing not only secures the property of the

the

the soil, but also its produce. In former times, the security which a man possessed over the produce of his fields, depended on the extent in which that produce, of whatever nature, was intermixed with that of others. The case is now greatly changed. The established laws of this country, when duly administered, are found sufficient for the protection not only of the persons, but of the properties of individuals; and although instances do happen where neither are secure from the effects of superior influence, where, although an individual is now and then crushed, and the most valuable of all the different sorts of property he can possess, "his good name," attempted to be wrested from him by the degenerated representative of some ancient feudal lord, yet the instances are rare; and fortunately, when any such occur, the impartial public never fail to stamp the character of the chief actor in the scene, however respectable for birth, title, or fortune, with cowardice, ignominy, and contempt. Every man's inclosed field is now considered like his castle, a place of security, in which his live-stock, his corns, his hay, or his implements of husbandry, may be deposited without risk of embezzlement; whereas till a farm be inclosed, the farmer cannot be said to be in full possession of it. Let him be as careful and attentive as he may, injuries are committed to his crops by his horses, cattle, or sheep,



sheep, while his fields are daily exposed to the depredations of all around. Inclosing, therefore, to all its other advantages, adds that of securing to the rightful owner the benefits that result from superior labour, attention and industry.

Shelter is another good consequence arising from inclosing. In proportion as a field or a country is bleak, naked, and exposed to chilling blasts and winter storms, in the same proportion will it be unproductive, compared with lands more favourably situated. Inclosing is a mean of obtaining, by art, a certain degree of that genial warmth so essential to the production of valuable crops, but which nature is not always pleased to bestow. "The warmest air," says a late provincial writer on agriculture\*, "lies nearest the surface of the earth, being that portion of the atmosphere, which, like a blanket, nature spreads over the soil and its productions; and hence fences of all kinds tend more or less to prevent such a valuable covering from being blown off by the winds." The beneficial effects of inclosing, whether the lands are to be occupied chiefly in tillage or pasture, are evident to the meanest capacity. Every day's experience proves, that where grounds are sheltered from the violence of storms, as by garden

\* See Mr Robertson's second edition of the Present State of Agriculture in Mid-Lothian, p. 77. Note.

garden-walls, or by plantations of forest-trees, they are more productive, and vegetation is earlier than in others similar in every respect, unless in regard to exposure. How many instances occur to establish this fact, in respect to large fields, as well as to gardens, orchards, &c. Let the observant farmer, who possesses an inclosed farm, examine that part of a field where, owing to the decay of the fence, the wind enjoys a free passage, and he will be satisfied of the benefit of inclosing, from the superiority of the crop in the other part of the field over that which is within the influence of this additional exposure. While, on the other hand, the possessor of an open field farm, by examining the superior verdure that takes place in any part of an open field that is by some accidental circumstances sheltered in a remarkable degree, may satisfy himself, that were the whole equally sheltered the produce would be more abundant. Besides the additional quantity of herbage which may, for the reasons above mentioned, be expected on inclosed fields, beyond what open fields of the same quality of soil produce, the benefit which live-stock enjoy from the shade afforded by the fences in summer, and the shelter in winter, are of the greatest importance. If a person go into an inclosed field in quest of any species of live-stock, during the heat of a summer day, he is sure to find them reposed at their ease under

the shade of some spreading tree, or of the fence, whether of thorn or of stone. If, again, they be sought for during a severe winter blast, they will be found crept together as close as possible, and in the most sheltered corner of the whole inclosure. If any person entertains doubts respecting inclosed pastures being better adapted for rearing and fattening live-stock than open fields, he may easily satisfy himself, by comparing the live-stock in an inclosed parish in England with that of one in the open-field state. The writer is much mistaken if he will not find them, in the latter, not only fewer in number, but each animal, on an average, 30 or 40 *per cent.* inferior in value. In short, inclosing may be denominated the first step towards effecting improvements in the breeds of the different species of live-stock. This is reasoning on plain established facts, and on such as afford the most indubitable evidence of the superiority of inclosed fields, whether for tillage or pasturage. Were farther proof necessary, the additional rent which is every where paid for inclosed land, beyond that paid for land of an equal quality in the open-field state, is sufficient to place the matter beyond all possibility of doubt. The increase in the value of inclosed land, either in property or lease, depends so much on the quality of the soil, and the mode of management afterwards adopted, that it is difficult to specify any particular  
sum



sum by the acre to which the rent may be advanced, by adopting this mean of improvement. Lands of a middling quality, good turnip soil, for instance, is probably benefited to a greater degree by inclosing, than those of superior or inferior quality. Lands of this description, in the open-field state, may be considered as rented to the full at 15 s. the acre, whereas there are few instances where such lands, when inclosed, are rented under 20 s.; an advance so great as to afford the proprietor a handsome profit after paying the interest of the money expended. Thus, not only does inclosing increase the quantity and quality of the produce, so as to enable the farmer to pay his landlord a higher rent, and to contribute a larger share to the revenues of the State, but from so many people being constantly employed in making and repairing the fences, inclosing in this view also must be considered beneficial. Many other advantages might be mentioned, as resulting from adopting this mode of improvement; but what is already stated appears sufficient to impress every unprejudiced person with the fullest conviction, that if there did not exist obstacles of a public or private nature, a much greater portion of the arable lands of Great Britain would have been long since inclosed, and a more extensive foundation thereby laid for the general establish-

ment of agricultural and other national improvements

When a proprietor or farmer adopts the resolution of inclosing an estate or a farm, there are several particulars that merit consideration before the undertaking be actually commenced. The most material are, the form and size of the inclosures, and the materials of which the fences should be composed.

Modern improvers have altered materially the form of inclosures from that most generally adopted in former times. This, it is suspected, however, may rather be called an alteration than an improvement. Although the old inclosures have not that regularity to recommend them, in point of general utility they may stand in competition with the straight formal lines which seem so essential in the opinion of those who have made the greatest deviations from the ancient rules of forming lines of division. The writer does not suppose, that all the people who inclosed lands in these kingdoms some centuries ago, acted on the same principles which regulates the conduct of the farmers in some of the counties of Wales; namely, that the more crooked the fences are formed, they will afford the more shelter\*; yet he is satisfied they were more correct in respect to the direction or line of

\* See Report of the Present State of Agriculture in the County of Brecknock.

of the fences, than many of those who may be called the great improvers of the present day. The old fences were planned with a view chiefly to inclose soils as similar as possible within each division; beauty or regularity does not seem to have attracted much of the proprietor's or farmer's attention; utility, it would appear, they kept principally in view. Our modern improvers, on the other hand, in too many instances at least, shew an evident disposition to sacrifice utility to taste and regularity in appearance. Hence, it is not uncommon in a new inclosed parish in England, or even in an estate in Scotland, where the proprietor has the sole power of management, to see several different sorts of soils in the same inclosure, which, with proper attention, and a little sacrifice of taste, might have been included in the adjoining fields with much greater propriety. Thus, in place of forming the fences in such directions as that the greatest advantage might have been derived, by not only inclosing and subdividing the estate, but also, by separating, in every possible case, soils of different and opposite qualities, it not unfrequently happens, that the sands of Norfolk, and the clays of Lincolnshire, are as it were inclosed within the same fence; than which it is impossible to figure any management more improper. If a regular rotation of cropping be adopted on a farm where each inclosure contains a variety  
of



of soils, it will of course be suited to that sort which most prevails. When the most prevalent soil is of a light and sandy nature, the portions of better soil contained in each inclosure, must be cultivated under a system, in regard to cropping, not the best calculated to produce the greatest returns. On the other hand, when the predominant soil is deep and fertile, that of a lighter nature must be exhausted, were a mode of cropping pursued calculated only for the soil of superior quality. Whereas, had a judicious arrangement been made in regard to the form of the inclosures, the good and bad soils might, in many cases, have been kept separate, and, as often happens, two rotations of cropping adopted on the same farm with equal propriety. Perhaps also, fences in straight lines, in place of curves, might be disputed on the score of taste; but that is a question foreign to the object of the present investigation, which has utility only in view.

The new inclosures differ as much from the old, in regard to size, as in form. The old inclosures generally contain from three or four to six or eight acres; few of such as can be properly denominated old, exceed ten; while those that have been formed in later times extend from ten or twenty, sometimes to forty or fifty. This difference in the size of inclosures is greatly, if not entirely, owing to the change of opinion

nion in regard to what was, and what now is, considered by individuals as the proper size of farms. In the same, or nearly the same proportion as farms were enlarged, so were the dimensions of the new inclosures. The more ancient inclosures, such as those in several parts of Essex, Kent, Suffolk, &c. are evidently too small, while those in many other districts are too large. There is a medium in regard to the size of inclosures, as well as in other things; and to discover and adhere to it, as nearly as circumstances will allow, is certainly for the interest of the proprietors, the tenants, and the public. Where the inclosures do not exceed three or four acres, the quantity of land taken up in erecting the fences is a very heavy *per centage*, viewing the inclosure as a part of the farm, of the estate, or of the national territory; a free circulation of air is also prevented, especially if there be hedge-row trees, to such a degree, that it may be difficult to say whether the crops are more benefited or injured by the fences, when so closely placed. As one of the most important advantages that can be derived from inclosing is shelter, large inclosures must, on the other hand, be equally improper. When a tract of thirty or forty acres is included within one fence, it would be absurd to suppose that the fence can afford the same degree of shelter, as if these thirty or forty acres had been subdivided into three or four fields.

When

When the inclosures are made so large, the advantage of fencing, in so far as regards shelter, must be merely a secondary object with the person who erects the fences.

Having pointed out the loss and inconvenience arising from too small, and from too large inclosures, it may be necessary to suggest what, upon the whole, ought to be considered the best size. This the writer proposes to do from the authority of Mr Bakewell, from whom the British farmers might have learned many useful lessons on subjects connected with husbandry. Besides what related more especially to the improvement of the different species of live-stock, it was the opinion of that expert farmer, *that fifty acres of pasture, divided into five inclosures, would go as far in grazing cattle as sixty acres all in one field.* If there was a man in the island that exceeded another in knowledge as a breeder and grazier, it was Mr Bakewell; his opinion, therefore, founded on the experience of many years, may be considered as conclusive, in regard to the proper size of inclosures, in so far as the breeder or grazier is concerned; and from what is above stated, it appears that from eight to twelve acre fields are best calculated for either of these purposes. Mr Marshall also, in corroboration of this, hints, in his Rural Oeconomy of Gloucestershire, that the most experienced dairy-farmers in that district consider what he calls



a suit of pastures as a more profitable mode of pasturing cows than one large inclosure.

As no farm can be kept constantly in tillage with advantage, and as the best mode of cropping that can possibly be adopted for the generality of soils, is, in the writer's apprehension, that by which nearly the one half of the farm is in tillage, and the other in pasture, it is necessary, in determining the proper size of inclosures, to have regard to the two great branches of husbandry, viz. grain and grass. In regard to the latter, so far as the practice of the two counties most remarkable for grazing and dairying can go, the matter seems determined; and in respect to corn husbandry, as middle sized inclosures enjoy the advantage of shelter to a greater degree than those of larger size, and a more free circulation of air than those of small dimensions, there can be no reason to hesitate in determining, that the size of inclosures best suited for the breeder, the grazier, and the dairyman's purposes, will also best answer those of the cultivator of grain.

The sort of fence most proper to be erected depends on various circumstances, as, soil, situation, and the ease or difficulty of procuring materials. The two chief materials used for fencing in these kingdoms are thorns or hedges, and stone walls; although others, as will be afterwards more particularly mentioned, are locally adopted.

Thorns will no doubt grow in the generality of soils and situations; yet there are some instances where the soil is so bad, and the situation so elevated, that they cannot be planted with any probability of success. On moorish soils with a tilly bottom, thorns never thrive. They may be nursed up to a certain length, by the application of lime, marl, or other forcing manures, but as soon as the roots penetrate into the till, the plants begin to canker and fog, and in a short time die. These soils, therefore, are of all others the worst for raising hedges; and if to this inferiority of soil be added an elevated situation, and consequently a bad climate, an attempt to raise hedges under such circumstances will prove as vain as it is ridiculous. In all such cases, where materials can be had on reasonable terms, stone walls ought to be preferred; but on the principle that a fence of any kind is better than none, in situations where thorns cannot be expected to thrive, and where it is impossible to procure stone, some of the inferior sorts of fences, after described, may be substituted with advantage.

The fences in common use in Great Britain are,

Thorn Hedges,  
Hedge and Wall,  
Stone Walls,  
Willows.

*Thorn*

*Thorn Hedges.*—Hedges of white thorn are not only the most common and the most ornamental, but in soils adapted for them the most useful, and, when properly planted, the least expensive of all fences. There are various methods adopted for planting, protecting and rearing thorns; some of these, as practised in particular districts, shall first be mentioned; and afterwards, such observations as appear likely to prove useful to those who may be engaged in planting and managing thorn hedges, in whatever part of the island they may be situated.

The ordinary method of planting thorns, in several of the southern parts of England, is the most expensive, in regard to the quantity of land usually devoted to the purpose, that can well be imagined. Thirteen or fourteen feet for each fence is the common allowance; an extent so great, as when a whole parish is inclosed in this way, must create a great deduction in the total number of productive acres. The first thing done, as a preparation for planting thorns, is to line out the direction of the intended fence, which is done by marking off two parallel ditches, the nearest edges of which are made distant about seven or eight feet from each other. In forming these ditches, which are usually about three feet wide at top, nine or ten inches at bottom, and between two and three feet deep, the earth is thrown on the central space, whereby a kind of



bank or mound is formed, which rises somewhat more than two feet above the original surface-soil, and is narrowed at the top till three or four feet in breadth. The mound or bank having been formed in the manner now described, a small trench is made in the middle; and after both the tops and the roots of the plants or sets are dressed and pruned, they are placed in the trench in a reclining position, at the distance of about three inches from plant to plant, and the roots afterwards covered up with some of the finest of the earth. On many occasions, a little dung, lime or marl, is at the same time applied; but the practice is by no means general. This method may be both necessary and useful, where open drains are requisite for carrying off the superfluous water; but on light, dry, friable soils, it must be considered improper, not only from the circumstance of so much land being occupied, but also on account of the sets of young thorns being liable to be parched, in consequence of being planted on mounds of dry earth, raised so much above the general level of the country. Although the method of planting thorns in some of the counties of Wales is, upon the whole, pretty similar to that above mentioned, yet it differs in some important particulars, which require to be explained. The mound of earth, which is not above four feet broad at the base, and seldom exceeds two at the top, is not formed till the sets  
be

be planted. These are selected of the greatest lengths that can be procured ; and being planted in the original surface-soil, the drains or ditches are dug on each side, and the earth thrown into the centre, to form the mound : When the operation is finished, the stems or tops of the plants appear eighteen inches or two feet above the surface of the mound. This practice of setting the roots of the plants so deep in the earth, although scarcely any where else adopted, appears well calculated to do away the objection just now stated, to planting thorns in mounds, or artificial banks of earth, where the soil is of a sandy nature ; as no continuance of dry weather, however severe, or of however long continuance, can possibly affect the roots of plants sunk to such a depth in the soil ; while, at the same time, as this practice is by no means uncommon in Wales, there is no reason to suppose that the vigour of the plants is obstructed by the roots being covered to such a depth.

In the north of England, particularly in Northumberland, a method of planting thorns different from any of these is very generally adopted. When the ditches are marked off, a course or two of the fods taken from the adjoining ground, but chiefly from where the ditches are to be formed, are placed on the space allotted for the mound, with the sward or green side downwards : While some of the labourers are employed

ployed in throwing the remaining earth from the ditches, others build a wall of sod on one edge of the mound, to the height of about four feet; and as the loose earth is occasionally thrown behind this wall, the mound, when finished, has a triangular form. The sets of thorns are then planted on the sloping side of the mound, and about a foot from the former surface. This mode of planting has evidently an advantage over the others in one particular, of great importance in an exposed situation, that of the young shoots of the plants receiving more shelter, in consequence of being set towards the base, in place of on the top of the mound. In another respect also, where drainage is not necessary it is superior, as by one ditch only being formed, which is very frequently the case, a considerable saving takes place in the extent of surface necessary for forming the fence.

The methods of rearing hedges in Scotland are considerably different from any of those above described. The most usual mode is to form one ditch only; it is seldom more, except when the soil is wet and marshy, than three feet wide at top, thirty inches or three feet deep, and eight or ten inches wide at bottom; after the first spit or spade depth of earth has been laid as the foundation of the intended mound, the sets of thorns are placed horizontally, with their stems towards the ditch; and a little of the best earth being laid  
over



over the roots, and dung or other manure, when deemed necessary, being applied, the remainder of the earth from the ditch is then laid over the whole. In consequence of making only one ditch, the base of the mound does not exceed three or four feet; so that about one half only of the ground that is required in England, is taken up in forming a hedge-row in Scotland, which, over an extensive tract of country, must prove a saving of no inconsiderable magnitude.

The only other method common in Scotland, is peculiarly adopted to loams, or other dry soils; and for such will readily be acknowledged by the intelligent farmer, as superior to every other. It is to plant the thorns in the surface-soil, without forming a ditch on either side. The line of the intended fence, to the breadth of twelve or eighteen feet is fallowed the season before; and previous to planting the thorns, the ridge is gathered up once or twice with the plough towards the middle, so as to create an additional depth of surface-soil. The sets are then planted in a small trench opened for the purpose; and being placed at an angle of about 45 degrees, the roots are covered up with earth and dung in the ordinary manner. The ridge is afterwards kept clean for two, three or more years, by planting green-crops, which are repeatedly horse and hand-hoed. The quantity of ground that a hedge thus planted takes up, is less than would be necessarily

cessarily occupied by any other permanent fence whatever. The expence of hoeing and keeping clean amounts only to a very trifling sum, while, by a better opportunity being afforded for performing the work completely, the thorns shoot up into a fence in a shorter period than when planted and managed in any other way.

Having now pointed out the different methods in which thorn-hedges are planted, some remarks on the particulars of after management may not be deemed improper.

Respecting the management of the plants in the nursery, it is unnecessary to make any observations; the sowing the seeds, and rearing the plants till proper for planting out in the field, being more within the province of the nurseryman, or the proprietor's gardener, than the farmer. All that the farmer, as planter, has chiefly to bestow his attention upon, in regard to the plants, is, that they be equal in size, well skinned, and healthy looking. An equality in the size of the plants is of more importance than people are generally aware of; as when small and large sets are planted promiscuously, the larger or stronger plants, by making more vigorous shoots, soon overtop the small ones, which in consequence soon become stunted and die. Negligence in this respect is the chief cause of the many gaps and breaches which are so frequently visible in hedge-rows, and which might

be

be prevented by due attention to fortifying the plants, so as that they be as nearly as possible of the same size. Thorns that measure about half an inch in diameter, where cut over, by way of pruning, before planting, that is, from six to ten inches above the offset of the root, is the best size for the generality of soils; and when clean skinned, healthy in appearance, and equal in size, there is no reason to apprehend, if the hedge should not succeed, that the failure is owing to the plants, especially if they have been transplanted and properly nursed before hand. Any of the winter months, if the weather be favourable, are proper for planting thorns; but care should be taken to have the planting finished towards the end of February, or at farthest by the beginning of March; as, if the season has not been remarkably backward, the sap begins by that time to ascend, and the buds to form, after which it would be highly improper to think of moving them from the nursery. Wherever observation has been made in regard to the difference arising from planting thorns early in winter, and late in the spring, the former period has always been found the best. The young sets, when planted in the early part of winter, not only push out more vigorous shoots the following season, but the hedge becomes also much stronger, and forms a fence a year at least before that planted late in spring.

When



When the ground in which the thorns are to be planted, is prepared in one or other of the ways already mentioned, the sets, when taken from the nursery, and before planting in the hedge-row, should be properly trimmed and pruned. This part of the planter's business requires to be performed with a considerable degree of attention, as much of the vigour of the first shoots of the plants, and consequently of the future success of the hedge, depends upon it. The pruning knife should be applied to the roots with more or less freedom, according to the state in which they appear. If they be fresh and sound, the greater number of small fibres that are left, the greater chance there is that the plant will shoot out vigorously in the spring; if, on the other hand, any of the fibres appear withered or decayed, they should be lopped off close to the principal root, and those only allowed to remain that appear in a healthy state. Besides cutting off any superfluous or decayed fibres, it is also common, and, in consequence of cutting off part of the fibres from the roots, necessary, to amputate the stem or plant, in order to prevent its becoming afterwards stunted. This ought to be performed with a gardener's knife, or other sharp instrument, so that it may be done as clean as possible; neither the skin of the remaining part of the plant being broken, nor too much of the wood remaining uncovered; as in either case the plant

is apt to bleed too freely, and to become proportionally exhausted. The sets being thus prepared, are placed, either in a horizontal direction, or slopewise, according to the form of the bank or mound in which they are planted; and afterwards covered, first with a little of the finest of the mould, and then with the other soil, to a moderate depth, leaving the tops of the sets only an inch or two uncovered \*. The distance at which the plants are placed from each other, is extremely variable in practice. Sometimes two rows, but more frequently one only, is formed. In the former case, the rows are placed about a foot asunder, and the plants from eight to ten inches distant in the rows. In the other, from six to ten inches is the common distance. When a hedge is kept thoroughly clean for a few years at first, and properly trained, planting in one row is a more successful method of securing a strong durable fence, than when the sets are placed in double rows; as the roots of the plants in a double hedge-row are so much more numerous, and require such an additional degree

\* Of the success attending the singular method of planting thorns four or five feet in length, and without cutting off the tops, as is common in Wales, the writer is not so well advised, as to induce him to recommend the practice to the attention of farmers in other districts.

degree of nourishment, that it is in very fertile soils only where thorns thus planted come to a proper size.

There are only two usual methods of protecting young hedges from the depredations of cattle, or other live-stock, that have fallen under the writer's observation, *viz.* by posts and rails, or by temporary fences formed of dead thorns cut from some neighbouring hedge-row; both these are so simple, and so well known, that a description of the manner of forming either is therefore rendered unnecessary.

Besides hoeing and cleaning young hedges, which ought to be performed regularly two or three times in the season, for the first three or four years, the only other particulars of management necessary to be described, are clipping or pruning, and cutting or plashing.

In some districts, after the thorns are planted, they are left to nature's charge, no artificial means being used to train them up in any particular form. In others, the gardener's scissars are applied with so little mercy, not only to the collateral branches, but also to the principal shoots or stems, that the hedge frequently becomes stunted in its growth, and dies; or if it survive such severe treatment, it would be better adapted for an ornamental subdivision of a garden, than for confining cattle within a given space. Both these modes of management, al-

though



though extremely common, are also exceedingly improper. To train a hedge properly requires a considerable degree both of judgment and of attention, and is seldom performed in a proper manner, unless by those who have been regularly bred to the business. While that formal sameness and affected neatness, so common about the gardens, parks and pleasure-grounds of proprietors, would neither tend to the strength, nor to the durability, so essentially necessary in farm-fences, a certain degree of art is at the same time requisite, in training them in such a manner that they may possess a proper degree of both; as, without strength and durability, they are of very little consequence to the husbandman. In place of lopping off the tops of young thorn plants, a practice which never fails to retard their increase in diameter, as well as in height, they should be permitted to shoot up without interruption, except where the more luxuriant plants are likely to overtop and injure those that possess less strength and vigour. These overgrown plants should certainly be cut over; and if this be done, and the side branches be pruned in a regular slope from top to bottom, still allowing the main stem, while it does no injury to those adjoining, to remain entire, each plant will increase rapidly in size and strength, and be enabled to nourish such a number of lateral branches,

branches, as will form a fence so close and compact, that no animal can possibly penetrate it.

When a hedge, from age, or, which more frequently happens, from total neglect, or improper management in rearing, begins to fall into decay, it becomes necessary to adopt measures in order to bring on a new spring or growth. This is done in various ways. That called *plashing* is most common. This operation is usually performed in the early part of spring, and in the following manner: After selecting some of the most healthy and pliable stems, (one generally in every foot length way of the hedge-row), the others are all cut over near the surface. Stakes of dead wood being then driven into the ground, at the distance of sixteen or eighteen inches from each other, the stems that were left standing, being dressed and pruned all the way from the bottom to near the top, are then nicked, or cut about half way over, within a few inches of the ground, and are interwoven among the stakes in a reclining posture. After the hedge is gone over in this way, the tops of the stakes, in order to render the fence more firm and secure, are wattled together by a kind of rope made of hazle, or other small twigs.

Sometimes part of the growing stems are cut over at the ordinary hedge height, (three or four feet), and left to answer the purpose of stakes; but as innumerable shoots spring, in the spreading

spreading or pollard manner, from the tops of these live stakes, and which, in time, overhang the shoots arising from the plashers, and from the roots of the stems that had been cut to the ground, the destruction of the hedge is, in many instances, the consequence of this mode of management. If a hedge be not allowed to be too old, that is, if it be cut down within fifteen or twenty years; and if it be plashed in the manner first described, and the plashers be carefully removed when the young shoots from the old roots or stools are so far advanced as to be incommoded by them in their growth;—a hedge may be renewed in this manner occasionally for ages: But if the wood of a hedge be allowed to get to too great a size, as often happens, or, if the plashers be allowed to remain and impede the shoots that spring from the stools of the former hedge, on which only a solid dependence can be placed for a new and vigorous hedge arising from the ruins of the old, there is little reason to expect that the succeeding hedge will be either substantial or durable.

Considering the annual havock committed on hedges, by employing inexperienced people to dress, prune and plash them, it is suprising that all the considerable proprietors do not employ people regularly bred to the business to manage the hedges on their estates. They might, as some proprietors in the counties of Leicester, Angus, Perth,



Perth, &c. do, covenant with their tenants to pay a professed hedger a yearly salary, in proportion to the extent of the different farms. Were this practice general, the fences would be kept in better order, the general expence greatly lessened, and, in place of so many failures as we see every where happen, success would attend almost every attempt to raise a substantial fence of live thorns around our arable and our pasture fields.

Every person must regret that hedge-row trees, which add so greatly to the beauty and ornament of a country, should in general prove so destructive, not only to the crops within their influence, but also to the hedges which they overtop. That hedge-row trees are attended with injurious effects to both cannot be denied; but that some are more destructive than others, and that by proper management some sorts might be reared, without being attended in any great degree with the bad consequences so generally complained of, are facts well established in those districts where hedge-row trees are most abundant. Both ash and elm ought to be particularly avoided in forming hedge-rows; as when these are planted, in place of growing to a proper height, they usually become bushy in the tops; and while their roots spread in proportion in the soil, their tops form as it were a cover over the hedge, which proves equally injurious at all seasons. Oaks, if not properly  
trained

trained when young, are liable to the same objection; as, wherever a low spreading oak is to be seen in a hedge-row, the hedge will always be found stunted in its growth. It ought therefore to be the object of the planter to train the young oaks, or other trees planted in a hedge-row, to as great a height, and as free of lateral branches, as possible; when this is done, the damage arising from hedge-row trees will be comparatively inconsiderable to the farmer, and will be greatly overbalanced to the landlord, by the shelter which they afford, and the degree to which the value of an estate is enhanced, when well stocked with thriving hedge-row trees.

*Hedge and Wall.*—There is a method of what may be called double fencing, very commonly adopted in Scotland, and which, for fields along the sides of highways and parochial roads, is certainly preferable to every other that has yet been invented; as, while it partakes of the durability, and in respect to the space necessary for forming it, of the œconomy of a stone-wall, it also affords the shelter usually derived from a thorn-hedge.

There are different ways of forming this sort of fence, according to the situation of the lands. When the field rises gradually from the road, the most common is, to build what is called a sunk fence of stone, the foundation of which is placed in the bottom of the drain on the road side; this  
fence

fence is built in front of the solid earth in the bank, and is raised as near the level of the field as circumstances will admit. The height of the wall is generally from three to four feet, sometimes more; the thickness at the foundation from fourteen to sixteen inches, according to the proposed height; and it is contracted as it advances, till at the top it seldom exceeds eight or ten. The wall being thus built, and afterwards covered with sods, forms a complete fence from the outside. The soil at the back of the fence having been properly prepared, either by trenching or ploughing, the thorns are planted at the usual season. The plants are placed diagonally, their tops being made to point outwards, whereby not only more shoots spring from the same stem, but the roots being by this means directed inward to the field, they find greater abundance of nourishment, and are also prevented from forcing against, or altering the position of the stone fence.

There is a method of forming this sort of fence very commonly practised in the county of Fife, which is better adapted for a flat country, or where the fields to be inclosed lie in a sloping direction from the road, or for a country where free stone cannot be conveniently had. When the thorns are planted, and the mound or bank formed in the manner described as the most common method in which hedges are reared in Scotland, an apparently superficial fence



fence of stone, of about thirty inches or three feet in height, (such as will be taken notice of by and by, when treating of stone fences, under the denomination of "Galloway Dikes,") is erected on the top of the mound, between the hedge and the field. This may be introduced with much propriety in every country where stone is abundant, as a method of subdividing, as well as of surrounding a farm with fences. If the durability, added to the shelter which the young plants receive from the stone-wall, be considered, the expence of erecting a protection of this sort, although somewhat greater in the first instance than that of post and rail in a district tolerably well supplied with wood, is, notwithstanding, amply compensated by the superior advantages that must necessarily result from adopting this method.

There is still another way of uniting a stone-wall with a thorn-hedge, in one fence, practised in Scotland. It differs from the first method only in this, that the thorns are planted horizontally near the middle of the wall, in place of diagonally in the surface-soil; and holes similar in shape, but less in size, than those common in dove-cots, are left in the wall, a foot or two from the top, to allow the thorns to push out. The stems shooting out at these openings naturally bend upwards, and, when they thrive, cover the whole upper part of the wall, giving to the fence

a very uncommon and novel appearance. This sort of fence is better calculated, however, for ornament than for use, and is chiefly adopted with a view of giving an air of neatness and taste about a gentleman's residence.

*Stone Walls.*—These, although by no means the prevailing mode of inclosing adopted in England at large, are yet common in many districts, as in the counties of York, Derby, Warwick, Somerset, and some parts of Wales; and in Scotland, if the highland districts be included, there is probably more land inclosed with stone walls, than with any other sort of fence.

In respect to the methods of erecting stone fences, a very short description will be sufficient.

There are three sorts of stone fences: *first*, Those made of free-stone, such as are common in the better improved parts of both kingdoms: *2dly*, Those formed of the stones collected on the tillage lands, or on the moors in Wales, and in the highlands of Scotland; and, *3dly*, Galloway dikes. These last, although most prevalent in the county whence they derive their name, are nevertheless common in several other counties on the north side of the Tweed. The mode of erecting the two former is similar in every respect, except in regard to dimensions, which, in all stone fences, vary according to the nature of the materials of which they are constructed. A greater quantity of materials, or, in other words,

words, a broader base or foundation, is, for instance, requisite to support the fabric, when the stones of which it is composed are so round, or irregular in surface, as all land stones are, that they connect only very partially, and, when laid together, do not form so compact a body as thin flat pieces of free-stone may be made to do. The ordinary dimensions of a fence made of free-stone, is from twenty-two to twenty-six or twenty-eight inches in breadth at bottom, becoming gradually narrower as it advances in height, (which of solid work seldom exceeds four feet and a half), till it contract to sixteen or eighteen inches at the top, on which is placed, edgewise, a guard or coping of the broadest and flattest stones that can be picked out for the purpose.

The fences made of what is frequently called moor-land stone are seldom less than three feet at the bottom, about the same height above mentioned, and narrowed at the top to eighteen or twenty inches. These fences are usually coped with sod, in the form of an arch, over which is frequently piled a number of small stones, with a view of preventing sheep from getting a firm footing on the top of the fence, and which is found, although a simple, a very useful precaution; as if any of these small stones fall down when a sheep makes an unsuccessful attempt



tempt to get over, it seldom makes a second at the same period.

One very great error frequently committed in erecting stone fences of this sort, and which ought always to be avoided, is casting the foundation too shallow; by this means, a violent frost, succeeded by a sudden thaw, has such an effect, in the first place, to contract, and in the second, to expand the pores of the soil, that the fabric must be considerably shaken; and whoever has attended to the circumstance will agree, that greater attention to this particular is requisite, as they must have discovered, that more stone fences fall in the spring of the year than in all the other seasons together. Another error not less common, although more inexcusable, is also frequently observable, viz. that of placing stone fences too near streams and small rills of water, by which means the foundation is often undermined. The impropriety of this conduct is so apparent, as to render any comment entirely unnecessary.

The Galloway dike is of singular construction, and in all probability the most formidable looking fence that ever was contrived. It is built in the usual manner to the height of from two feet to thirty inches; a covering of the flattest stones that can be conveniently procured is then laid over; above which is placed with great art, but seemingly in the most artless manner,

what

what may not inaptly be called a net-work of stone. This is done by piling rugged sharp cornered stones one above another, to the height of upwards of two feet, in such a manner that each succeeding stone jams that which was formerly placed, in a manner that gives stability to the fabric, while the interstices are so great and numerous, that, to a superficial observer, the whole has so much the appearance of being in a tottering situation, that neither man nor beast are disposed to undertake the seemingly dangerous attempt of crossing it.

Much has been said respecting the advantages which hedges possess over stone walls, and *vice versa*. If a fair comparative statement were made, it would be found, that each has a claim to superiority in some particulars in which the other is entirely destitute. No care or attention can render a thorn hedge, of itself, fencible for four or five years; whereas a stone wall, provincially, "a dike," is in its greatest state of perfection when immediately completed; or, in the words of a late Scotch nobleman \*, "*it becomes major the first year.*" Hedges will not thrive in some soils, nor in exposed situations, while, by the ordinary method of planting them, they require a great extent of surface; whereas stone fences may be erected almost anywhere, and on very narrow bounds.

Thorn

The late Lord Elibank.

Thorn hedges are formed of more perishing materials than the generality of stone dikes, and consequently require more expence and trouble to keep them in complete repair; besides, when by any accident gaps or openings are made in a hedge, it is difficult, almost impossible, to repair them again; but as the materials of a stone dike always remain, a little labour only is requisite to put it in the former order. On the other hand, the expence of erecting stone fences, even where the materials are within a reasonable distance is much greater. They do not afford that degree of shelter which a well managed hedge in full growth is calculated to give; and what is very much against them, they yield no return. The loppings of a thorn hedge are useful for many purposes, and, in a course of years, may be sold for a much greater sum, in ordinary situations, than is sufficient to defray the whole expence of the original cost and after-management put together. The expence of a stone fence, on the other hand, remains a dead weight on the proprietor and tenant; and no advantages can be expected beyond what may be derived to a greater extent from hedges after the first few years. On the whole, however, it is evident from the above statement, as well as what was formerly mentioned, that some situations are better adapted for one of these sorts of fence than the other. On that account it would  
be



be extremely improper, in the writer's opinion, for any person who was endeavouring to point out the best means by which the agriculture of the country could be improved, to impress the reader with an opinion that the one, under every possible circumstance that could occur, was preferable to the other. Thus far such a person may safely assert, viz. that the land must indeed be of a very inferior quality, and very unfavourably situated in respect of climate, if it could not be improved by inclosing with hedges or stone walls, or by one or other of the methods to be afterwards described, to an extent very far superior to any expence which, with prudent management, could be incurred.

*Willow Fences.*—In low marshy lands, and along the banks of rivers, where thorns cannot be expected to thrive on account of the superabundance of moisture, and that they are liable on several occasions to be overflowed, and where also stone cannot be procured, the Dutch willow is frequently used as a fence. When proper care is bestowed, this mode of fencing is, in all such situations, greatly preferable to any other, affording, besides shelter and security, large quantities of wood extremely serviceable for many purposes of husbandry; and which, as it can be converted to many useful domestic purposes, is saleable at a high price. The Dutch willow, as well as every other sort of willow, is propagated by cuttings or layers, and requires  
very

very little attention, either in the planting or after management; and for these reasons, ought to be very generally cultivated in situations similar to those above described.

*Earth Fence.*—The only other sorts of fences common in these kingdoms, besides those of a moveable nature, as hurdles, &c. are such as are composed chiefly of earth or turf. These are for the most part erected in the less improved parts of the country, and are constructed in various forms. On the higher grounds in Yorkshire, and in several parts of the north of Scotland, they are formed of turf cut from the adjoining land, and built up with a considerable degree of regularity. The mound, when finished, is from three to four feet at bottom, rising to about four feet and a half, and narrowing as it rises, till it contract at the top to about eighteen inches.

This of all others is the most superficial, and, on that account, probably the most expensive sort of fence.—The uncertainty in which the farmers in Yorkshire are generally kept in regard to possession, and the parsimony of the landlords in the north of Scotland, are the only reasons that can be assigned for this mode of fencing being adopted, in districts where stone can be procured, or hedges or other kind of live fence can be reared.

In

In the county of Cardigan in South Wales, an improvement on this mode of fencing has been introduced, which merits the attention of those who, from whatever cause, are under the necessity of adopting a method of fencing inferior both to hedges and stone walls. The farmers in that country form a bank of somewhat larger dimensions than that just mentioned, by placing alternate layers of stone and turf; on the top of this bank, when finished, they plant white and black thorn, or sow furze seed. These except in very bleak exposed situations, thrive so as to become a substantial and durable fence, while the additional expence is not worth the naming.

One other particular, in regard to fences, remains to be taken notice of, namely, the construction of the gates. — The form, which is as variable as the shape of a coat, merits no attention; whether it is cut out in a fine ginger-bread ornamental form, or put together in a plain home-spun fashion, is of little consequence. It is of more importance that it be so balanced on the hinges that it opens without difficulty, and, after being folded back to a certain extent, that it shuts again of its own accord. Without this is the case, time is unnecessarily lost in opening it, while the risk of its remaining open, from carelessness or inattention, is great, and the damage incurred from that circumstance in many instances very considerable.



The advantages to be derived from inclosing have already been stated, and it has also been observed, that were there not obstacles, both of a public and private nature, to prevent it, the practice would soon become general.

Besides that of a public nature, (the impossibility of inclosing an open-field parish in England without a special act of Parliament, which will be particularly taken notice of on a future occasion), there are others which, although of a more private nature, operate as powerfully against the general introduction of this mode of improvement. One of these was formerly mentioned, namely, the disposition of proprietors to add to the extent rather than to the intrinsic value of their former property. Another great bar to the general inclosure of the country, is the speculative idea that too many purchasers of land in the present times seem to entertain, whereby they are induced to purchase beyond the extent of their capital; than which they cannot be guilty of a more glaring piece of misconduct, either in regard to their own or the public interest. Nothing, in the first place, can more effectually lay a foundation for these unpleasant sensations that naturally arise from an embarrassed situation; while, in the second, people so situated have it not in their power, by liberal expenditure of money, to improve their own or the national resources.

The

The abominable system of entailing property, as established in Scotland, is another great bar to the improvement of the country by inclosing. Proprietors of such estates being, in many cases, only lifeholders, are not disposed to expend their own money ; and they are in general debarred, by the nature of the restricting clauses in these deeds, from granting leases of such duration as to induce active and enterprising tenants to lay out a share of their capitals in inclosing and subdividing their farms. While such bars as these continue unremoved, there is little reason to hope, that this essential mean of improving the national territory will ever be universally, or even generally adopted.

CHAP.

---

---

## CHAPTER XXV.

### *The Importance of Draining, and the different Ways in which Lands are drained.*

A SMALL degree of observation is sufficient to satisfy every person of the bad effects that a redundancy of water has upon vegetation in particular fields, as well as on the health of the inhabitants in extensive districts. The necessity of bestowing minute attention to the removal of this evil is as demonstrable as any proposition can possibly be; as land incapable of being drained, will invariably be found incapable of being improved by the use of any other means. Every farmer, therefore, who possesses lands naturally wet and spouty, will find it for his interest to make draining precede every other mean of improvement.

The draining of land is, in many cases, one of the most interesting particulars that can fall under the farmer's review, and is frequently a labour so difficult as to require the greatest exertion



tion and attention, even of the most active and judicious, to accomplish. It may therefore, ultimately, prove fortunate for British husbandry, that the members of the Board of Agriculture have turned their attention to this object. Respecting both the theory and the practice of draining, the nation have a title to look for a full and accurate account from Mr Elkington, through the medium of that Board, by whose application to Parliament he received a handsome premium, as an inducement for making a full disclosure of all he knew respecting both.

The theory of draining is intimately combined with that of the different subsoils or under strata. To be able to drain land with certainty requires, besides long practice, a thorough knowledge of the various strata of which the earth is composed, and to what degree each stratum, compared with the others, is pervious or impervious to water. Without a competent degree of this sort of knowledge, Mr Elkington's method of discovering springs by boring, would much oftener prove unsuccessful than they do; nor could the miner, but by a knowledge of the different strata, determine, with accuracy, where, by boring, he had the best chance of discovering coal, or other minerals.

The wetness of land may be owing to one or other of several causes, and sometimes to a combination of two or more together. It frequently happens

happens that land is wet, owing to its situation, although naturally dry. When a field lies adjoining to higher grounds, it is apt to be overflowed; and when it has no descent by which the water can be drained off, it must necessarily rest upon it, till it is either exhaled by the influence of the sun, or sinks gradually through the substrata. This is frequently the case adjoining to rivers, and also in low situations near the bottoms of hills, whence the rains sometimes descend in torrents, and overspread the adjacent fields.

In other cases, the wetness of land may be accounted for, by the water which had sunk through the strata of the higher grounds forcing its way up, in great quantities, through a bed of clay, moss, or other stratum, possessing the power of absorbing and retaining water; and to which is to be ascribed the formation of all marshes, swamps, or bogs. That wetness in land which is most injurious to the farmer, and to the removal of which his attention is most frequently called, is that which issues from the sides and bottoms of hills and rising grounds, in the form of springs, and which, for want of a free passage perpendicularly, often bursts out horizontally, and saturates the adjoining lands to such a degree as to render them, in a great measure, unfit either for tillage or pasturage.

Dr

Dr Anderson, who lately claimed the merit of having long since laid before the public that secret respecting draining, for the divulging of which Mr Elkington has been so handsomely rewarded, has, in his *Essays on Agriculture and Rural Affairs*, published in 1776, Vol. I. p. 169, &c. given the following very ingenious account of the origin of land-springs\*. “ Springs are  
 “ formed in the bowels of the earth by water  
 “ percolating through the upper strata, where  
 “ they are of a porous texture, which continues  
 “ to descend downwards, till it meets with a  
 “ stratum of clay that intercepts it in its course ;  
 “ where, being collected in considerable quantities, it is forced to seek a passage through  
 “ the porous strata of sand, gravel, or rock, that  
 “ may

\* The writer has not the most distant intention of taking up the controverted point, whether Mr Elkington or Dr Anderson has the merit of being the first discoverer of this so much talked of method of draining. This much, however, he feels himself called upon to state in favour of his countryman Dr Anderson, (but without being prejudiced in consequence of that circumstance,) that in the course of his various tours through Scotland, he has fallen in with several respectable farmers, who have declared, that by perusing Dr Anderson's *Treatise on Draining*, and adopting the methods recommended by him, they were enabled to drain their farms in the way nearly similar to that practised by Mr Elkington, and many years before his name was ever heard of in that kingdom,



“ may be above the clay, following the course  
“ of these strata till they approach the surface  
“ of the earth, or are interrupted by any ob-  
“ stacle which occasions the water to rise up-  
“ wards, forming springs, bogs, and other phæ-  
“ nomena of this nature, which being variously  
“ diversified in different circumstances, produce  
“ that variety of appearances, in this respect,  
“ that we often meet with.” The Doctor adds,  
in another place, (page 71.) “ It is necessary  
“ that the farmer should attend to this process  
“ of nature with care, as his success in drain-  
“ ing bogs, and every species of damp and spouty  
“ ground, will in a great measure depend upon  
“ his thorough knowledge of this; his acute-  
“ ness in perceiving in every case the variations  
“ that may be occasioned by particular circum-  
“ stances, and his skill in varying the plan of  
“ his operations according to these.”

From this remark may be inferred the impossibility of laying down any specific rules for under-draining, so as to suit all soils and situations. The size of the drain must depend entirely on the quantity of water it is meant to convey, and the number and direction on that of the springs, and the situation of the ground in regard to out-fall or drainage-level. The drains common in Great Britain are known under two general names, *viz.* open and covered drains. The former, which is made use of chiefly for intercept-  
ing

ing and carrying off the water that descends from the higher grounds, or such floods as overspread the fields, in consequence of long-continued falls of rain, differ more from each other in size than in form. The covered drains, on the other hand, differ almost in every district, and not less in the size and form than in the materials of which they are formed.

As the draining of land may with much propriety be called the *sine qua non* of husbandry, the writer shall endeavour to describe the various methods adopted in these kingdoms with all the minuteness which, in his opinion, the importance of the subject merits. In order to bring it more immediately under the reader's view, the various sorts of drains are enumerated in the following list; and which, after having given a short account of Mr Elkington's method of draining, will be treated of in the order in which they are arranged :

Drains, formed of Bricks ;

Free-stone ;

Land-stone ;

Wood ;

Sod ;

Peat ;

Straw ;

VOL. III.

X x

Sinking

Sinking pits ;  
Open drains ;  
Water-furrowing, &c.

*Mr Elkington's Method of Draining.*—Mr Elkington is a farmer in Warwickshire ; who, having about fifteen or sixteen years ago rented a farm in that county, in which was a considerable extent of wet boggy land, tried an experiment in draining, which proving successful in that instance, and in many others which he afterwards made on other lands, by degrees, raised him into notice as an expert drainer. The method of conducting this experiment was by cutting deep drains, and afterwards using an instrument somewhat similar in construction to an auger with which he bored through the different under strata at the bottom and sides of these drains, with a view of piercing, or, as it is technically called “ tapping ” the springs. Mr Elkington's success in draining is well known in many parts of England ; and is mentioned in the Report of the County of Warwick in the following words : “ The novelty of this practice “ (boring) here, and Mr Elkington's mysterious manner, in declaring he knew where “ and in what direction the different strata of “ the earth divided, and at what particular point “ an auger hole might be bored, to lay dry this “ or that particular spring or well, were matters “ which



" which attracted much notice, and occasioned  
" great surprise; and it is but justice to Mr  
" Elkington to say, that in one class of bogs,  
" &c. which abound as much as any other, he  
" has not only had the honour of introducing  
" the auger in this county, but the merit of lay-  
" ing effectually dry many large tracts of land."  
The beneficial effects of this method of drain-  
ing are now well known in the counties of War-  
wick, Worcester, Gloucester, Leicester, North-  
ampton, Derby, &c.; and although Mr Elking-  
ton hitherto remains unrivalled as a drainer,  
yet there are several people in these districts  
who, from practice, have acquired considerable  
knowledge in the art, which obviously consists  
in determining, with a degree of precision,  
where the bores are to be made with the great-  
est probability of success. It is not to be sup-  
posed, that any man can arrive at such per-  
fection as is hinted at in the above extract;  
Mr Elkington himself is often disappointed;  
nor should any person be surprised that this  
should be the case. The degree of success so  
frequently attending this method of discovering a  
current of water, which is perhaps too weak to  
force itself out at the surface as a natural spring,  
but ready to make its escape when an artificial  
opening is made, has in so many instances pro-  
ved successful, that every farmer, who possesses

wet

wet spouty land, ought also, as is the case in all the counties above mentioned, to be possessed of one of these instruments. The auger or borer is in every respect similar to that used by miners for discovering coal, marl, &c. The point is somewhat of the auger form, from two to three inches in diameter; the rod, which is about an inch square, may be made of any length; but, for the convenience of working, it is commonly formed in pieces of about three feet long. These separate pieces being made to connect with each other by screws, are used as occasion requires. Two men are necessary for working it, which is done by fixing a cross bar of iron on the top of the rod, by way of a handle. The operator having lined off the intended drains in what he conceives the best possible direction, and these having been formed, the operation of boring commences. When successful, and the spring or springs are tapped, the current of water is allowed to run for some time before the drains are covered up; in the method of doing which there is nothing particular, as it depends partly on the quantity of water, and the materials that can be most easily procured.

The writer had once an opportunity of seeing the operation of tapping performed in Northamptonshire; the manner of performing which, and its consequences, he shall endeavour to describe: The ground intended to be drained was  
rather

rather flat; it was bounded on the one side by a river, and on the other by a sloping bank, whence oozed the water that injured the field. A drain having been made from the river towards the sloping bank, and another cross one running parallel, and near to the foot of the bank, the auger was used; an attempt or two was first made in the drain running from the river to the bank; but, although some of the adjoining grounds were very swampy, without success. These attempts to get at the spring having failed, the borers began their operations in the cross-drain, which in the very first instance was crowned with success exceeding their most sanguine expectations. About three or four feet below the bottom of the drain, and probably at upwards of three feet below the bottom level of the adjoining river, they tapped the spring; and having withdrawn the borer, the water boiled up with great violence, rising to a considerable height, and having fallen into the bottom of the drain, ran towards the river. Means so effectual for curing the evils arising from subterraneous water, had no doubt in that instance, as they must in every other, the effect of rendering the field much more valuable both to the proprietor and tenant, while the expence of boring, by which only in this case the evil could have been effectually eradicated, is not worth mentioning.

When



When it is intended to form drains with brick or stone, unless where an extraordinary depth is requisite, they are usually made about three feet deep, from twenty-four to thirty inches wide at top, and from nine to eighteen inches at bottom. When it is proposed to use wood, sod, &c. the dimensions are much less, as will be afterwards more particularly explained.

*Drains formed of Bricks.*—In several counties of England, where stone is difficult to be procured, bricks are frequently used for making drains. Sometimes bricks of the usual form are used, two or three being laid at each side, one above the other, and others lengthwise across. In some places bricks of a particular form are moulded for the purpose. When for small drains, they are formed in the shape of an arch, and placed one by the side of the other in the bottom of the drain. When the drains are meant to convey a considerable current of water, the bricks are made broad at the base, and taper up on one side, (that which is placed next the sides of the drain), till about half the breadth of the base. This last mentioned sort is placed in regular lines on each side of the bottom of the drain, and are covered over with broad flat pieces of free-stone, and afterwards, as in every other case, the remainder of the drain or ditch is filled up with the earth which had been formerly dug out. Drains made of bricks have their advantages

vantages and disadvantages. They answer best in soils naturally dry, such as lie on an under stratum of gravel, and where the chief design of drains is to carry off water arising from springs in particular parts of the field. Rain-water falling on such soils sinks very rapidly, and in few cases obstructs or injures vegetation; but, in these soils where rain-water sinks more gradually, and where of course drains are necessary, for the double purpose of carrying off water arising from springs, and that which lodges in the soil and oozes out at the sides of the drains, the bricks in these drains, being closely placed together, do not give such a free passage to the filterings from the sides of the drain as those formed of stone, in the ordinary way, are calculated to do.

*Drains formed of Stone.*—These vary considerably, sometimes owing to the difference in the materials of which they are formed, and frequently to the practice of particular districts, in regard to the manner of placing the same sort of materials.

In filling up drains, where small stones collected from the adjoining lands are used as means of preserving a passage to the water, there is no variation in the practice of any particular district from that of others, nor is much attention anywhere bestowed in regard to the manner of placing these materials. They are usually thrown  
in

in promiscuously, to the depth of about eighteen inches; and being covered with straw, fern, or rushes, the remainder of the drain is filled up with earth. In some places, a method which appears extremely well calculated for preventing the interstices between the stones from being choaked up with sand or gravel is adopted, that is, placing a layer of long broom, rushes, &c. in the bottom of the drains before the stones are thrown in. This, in all drains which have considerable declivity must be attended with good consequences, especially if there is a current of water, as it is apt to break up the bottom of the drain, and to carry the sand or gravel along with it, till being obstructed in the passage, they lodge, and by degrees stop up the course. If drains of this description are filled to a proper depth with small stones (about the size of a man's fist), and a layer of straw, rushes, &c. spread both below and above them, so as to prevent the intermixture of earth, they must not only be durable, but the water in its passage less liable to interruption than in any other that are formed of stone.

Another method of constructing drains of stones collected from the land, is to select the largest and broadest of them, and to place them triangularwise in the bottom, leaving a small vacuity in the middle for the water to run. When the stones best suited for the purpose are placed in  
the



the manner now mentioned, small stones are laid over them to the usual depth, and over them again, straw, earth, &c. As this sort of drain is calculated to give a more free vent to the water, it may be considered as an improvement on the other method, wherever any regular and constant stream is expected.

There are two methods of forming drains with free-stone, which, as they are materially different from each other, require to be separately described. The first is to build two narrow walls, one on each side in the bottom of the drain, (which in such cases is made considerably wider than when land-stones only are used), and to connect these walls by a cover of stone on the top. The size of the open part of the drain, when thus finished, is about eight or ten inches in height, and six or eight in breadth. When small land-stones can be procured, they are laid above the cover of the free-stone to the depth of ten or fifteen inches, and a layer of straw, rush, &c. or of turf with the green side downwards, being placed over the whole, the earth is then replaced.

The other drains constructed with free-stone, seem extremely well adapted for the purpose of drainage, when the filterings from the subsoil, as well as the runnings from the spring, require free passage. Two flat stones are placed edgewise, one edge of each coming into contact with

the other at the bottom, and the others resting on the sides of the drain; on the top of these are laid horizontally other flat stones by way of cover. This sort of drain, when properly made, has a resemblance to the letter A reversed, and not only affords two courses for the water from the main spring, but also gives free admission to that which oozes out at the sides from the subsoil. A drain so formed, will bear any pressure that it can be subjected to; and for the double purpose above mentioned, seems as well calculated as any other that can be formed.

The practice of forming drains of brushwood, sod, straw, &c. is by no means generally adopted; but as some places are but very indifferently supplied with the best materials (stone) for draining, the practices of such districts as must have recourse to other means for getting free of superfluous water, probably to a greater degree, merit particular notice.

*Drains formed of Wood.*—Drains of this sort are very common in Suffolk, Essex, Hampshire, and many other districts in England, and are constructed in the following manner: A drain from twelve to fifteen inches wide, is in the first place formed to the depth of ten or twelve inches; and when the loose earth at the bottom is taken out with the common spade, the labourer using one not exceeding three or four inches wide, tapering nearly to a point, makes a narrow

row cut to the depth of six or eight inches more; and the loose soil at the bottom being taken out with a kind of scoop, bent and formed for the purpose, the labour of forming the drain is completed. Then willow, thorn, or any kind of brushwood, as the boughs of trees, &c. is cut into lengths of twelve or fifteen inches, and laid to the depth of several inches, according to their strength, across the top of the small drain, and made to rest on the sides or shoulders which constituted the bottom of the larger drain before the narrow cut was made. By this means a clear passage, six or eight inches in depth, and from two to four inches wide, is left for the water. The brushwood being properly placed, and to a regular thickness, is covered with a layer of straw, to prevent the earth, when replaced, from falling into the gutter below. This may appear to some as a very superficial mode of draining; when compared with drains made of stone, it no doubt is so; but it is surprising how durable, and, in many instances, how effectual they are. The writer was informed, in the county of Essex, that instances are there very common, where drains of this sort have been known to last upwards of thirty years. Much of their durability is understood to depend on using green new cut wood, in place of that which had been allowed to remain so long exposed to the influence of the weather after being cut,



cut, that the natural sap was dried up. As this is a cheap, and, when well executed, an effectual mode of draining, and durable beyond the period which farmers in general acquire of what may be called a permanent interest in the success of drains on any farm, it may be for the interest of those who possess short leases, and where stone is not to be had without an extravagant expence of carriage, to use wood, as being for that purpose next in durability to stone or brick.

*Drains made of Sods.*—Where the soil is of a very tenacious nature, and old sward-turf can be procured, it is not uncommon in some districts, where neither stone, brick, nor wood, can be easily obtained, to use sod or turf in the construction of drains.

This is the case in some parts of Yorkshire and Wales, and in the counties of Nottingham, Buckingham, Essex, &c. The drains having been formed in the manner described when brushwood is used, the sods are laid on the top of the narrow part of the drain, with the green side downwards, and being rammed down as hard as possible, form a kind of reversed arch over the open part of the drain. This is found from pretty general experience, in the districts above mentioned, to be a very cheap, and, considering the materials, a surprisingly durable method of draining; answering, in pasture-fields especially, all the purposes that the farmer can expect to

to derive from drains constructed with more labour, and at a much greater expence. They are said to last frequently twenty years and upwards; but the period which it can be supposed they will continue to prove effectual, must depend on the nature of the soil, and the current of water.

*Drains formed of Peat.*—Peats are materials for forming drains, which few people would have thought of. Drains formed of peats, are, it is believed, peculiar to Lancashire, and introduced there only within this short period.

The following account of this mode of draining is extracted from the Agricultural Report of that county: "A piece of peat, the usual shape  
" and dimensions of the common turf, has been  
" made use of. After piercing the turf with a  
" kind of punch, when wet, by which a hole  
" is left of about three inches square, a little  
" arched at the top, and which are placed, af-  
" ter being hardened in the air, side by side;" and for which the writer adds: "The Agricultural Society at Manchester rewarded the in-  
" ventor with a premium." From the preceding very imperfect description, it is impossible for any person to determine whether the peats are laid edgeways in the bottom of the drain, and that the hole that had been punched out is meant to answer for a pipe through which the water is to run, or whether they are laid the  
broad

broad way, so that the cavity of the arch answers that purpose. But in either case it may be inferred, that the country about Manchester must be very destitute of materials for forming drains, when the Society, instituted for the purpose of promoting Agriculture, deems it proper to give a premium for such an invention. There is no question but some peats, which, when thoroughly dry, are of a very hard nature, might, when laid in the bottom of a drain, and properly covered up, continue to retain their hard firm nature in some degree like bricks, and might, on that account, be rendered useful in draining lands; but that peats of the common size (rather less than bricks, should, by laying one row of them in the bottom of a trench, prove materially beneficial in draining the adjacent lands, appears to the highest degree improbable. It is, however, the Lancashire method of using peats in forming drains, rather than respecting the propriety of using them, that the writer entertains any doubt. He has on very many occasions seen peats, which, when dry, were of so hard and durable a nature, that he has no doubt but they would last, when covered up, for ages: Therefore, new as the idea of using peats in place of brick or stone in the bottom of drains may be, this method may nevertheless be worthy the attention of those who have not access to brick or stone,



stone, but who have it in their power to procure a liberal supply of peat.

*Drains formed of Straw.*—There is probably no other county in Great Britain where straw is the only article used in forming drains, with a view of preserving a free passage to the water issuing from springs, or filtering through the subsoil into the open part of the drain, besides Middlesex. The trench is made of the same dimensions as described when treating of drains formed of wood and sod; and when completed, ropes of straw, twisted by a machine, such as is used for twisting hay that is exported, and in ropes about the size of a man's leg, is laid on the top of the narrow part of the drain; and being thrust down as hard as possible, and the loose earth that falls into the bottom, in the course of the operation, being carefully scooped out by the labourers as they go along, the straw is then covered up with earth in the usual manner.

From the preceding account of the covered drains used in these kingdoms, it will occur to the observant reader, that those made of stone or brick are best adapted to carry off water issuing from springs, and that the others can only be used with propriety where the object is to drain off the water that oozes through the soil, and which, if not carried away by under drains, would chill the subsoil, and greatly injure vegetation. But as many farmers are so situated, that materials of  
some

some sorts only can be commanded in abundance, while others cannot be had on any terms, the writer judged it proper to give a short description of all the different sorts of materials which has come to his knowledge, as being used in any part of the island; and that farmer must be indeed ill situated, who has it not in his power to command some one sort, or rather to make an election of one sort in preference to two or three others, though there are perhaps very few that can command all the various sorts in abundance. One thing is very certain, that in many parts of Scotland, the business of draining land is rendered much more expensive than there is any occasion for; as if these narrow drains covered with brushwood, sod, straw, &c. answer the purpose in strong adhesive soils in England, as they certainly do, it would be difficult to give a substantial reason why in similar soils they should not be equally efficacious in Scotland.

*Sinking Pits.*—Some fields are so extremely ill situated, in regard to outfall, or descent for drainage, that it is not possible to free them from water, either by open or covered drains, so as to render them at all times fit for tillage or pasturage. If, in a field so situated, the farmer can discover a sub-stratum of sand or gravel in any part of it, to which, by opening a drain, he can conduct the stagnated water, and if he will there dig a large pit, the evil will be removed, as the  
water

water will sink rapidly through the stratum of sand or gravel. Should this answer the purpose, of which, in most cases, there is little reason to doubt, he has only to fill up both the pit and the drain with stones collected from the land; and the improvement will not only be effectual, but permanent. This method of drainage, it must be allowed, is liable to one objection, namely, the risk that, by opening a communication to the stratum of gravel through the impervious superstratum, the evil, in some cases, may, in place of being removed, be increased, by an additional eruption of water. To obviate this difficulty, it is an easy matter to make a trial with the borer before the pit is dug: If there be an appearance of a spring rising, the bore may be easily closed, and a trial made in another place.

*Open Drains.*—In low wet situations open drains are frequently formed, for the double purpose of carrying off the superfluous water, and of fencing the fields. In all such cases, the size of the drain must depend on the situation of the farm. If the drains of a particular farm be unconnected with those of others, there is little difficulty in regulating their size according to the probable quantity of water to be drained off in consequence of floods; but if the drains connect with those of other farms situated at a greater distance from the outfall, they ought to



be made of much larger dimensions than is necessary for the drainage of that particular farm only, otherwise the adjoining lands will be in danger of being overflowed after every extraordinary fall of rain.

The lines or directions of the drains must also depend on particular circumstances. Where an opportunity is afforded to line them off in that way which, in a flat country, is best calculated to answer the purpose of drainage, some longitudinal drains ought always to be made, as being best for conducting off the water; but cross drains are equally useful for intercepting and gathering it. All fields where open drains are necessary, ought therefore to be rather broad than long; as although the furrows on a field nearly level are very good conductors of water for a short space, yet they do not answer for conveying it to any considerable distance.

There is one general rule in regard to the dimensions of open drains that ought always to be attended to, namely, to make them slope one foot for every foot of depth. A great slope is not so necessary in strong clay soils as in those where there is sand or gravel in the bottom; but in the generality of soils, an adherence to the above rule will be found best calculated to answer every useful purpose; and such drains have also a better chance of standing than those of any other form that is likely to prove useful.

If

If open drains are to be formed in strong and adhesive soils, where there is an under stratum of sand or gravel, it will always be found attended with the most beneficial effects, and far surpassing the additional expence that may be thereby incurred, to cut through to these; by that means a complete power of drainage will be obtained; as if any covered drains are afterwards found necessary in particular parts of the field, these may be opened with a perfect certainty in regard to their utility.—Some few proprietors in both kingdoms, although the number is not large, shew a very laudable attention to the draining of their estates, in so far at least as to covenant with their tenants, that they shall clean out all the open drains on their respective farms once every year, and by a certain day; and failing of which, the proprietors reserve a power of doing it at the tenant's expence. As this is a measure calculated evidently for the interest of both parties, it should be made a general rule on every farm where open drains are found necessary.

The drainage in the counties of Cambridge, Lincoln, Huntingdon, Northampton and York, where that mean of improvement is, more essentially necessary, owing to the low situation of a great proportion of the best lands, is more neglected, or rather mismanaged, than in any other part of the island. Were it to become a question,

sion, whether the agriculture of these valuable counties has not been injured to a greater extent than all the profits arising from the inland commerce would counterbalance? it is believed it would be determined in the affirmative. At least, whoever has travelled over the low parts of these districts, cannot but have observed, that the numerous inland navigations, so common in that part of the country, operate as a great, and as they are at present conducted, (the proprietors of the navigations and the proprietors of the soil having separate and opposite interests), as an unsurmountable bar to the complete drainage of these otherwise valuable lands.

*Water Furrowing*.—Is the necessary operation of clearing out that part of the mould which had fallen into the furrows when the seed was harrowed in. This is very effectually done with the common plough, which is not only drawn along the furrows, but also in such other directions through the field, as the ploughman's eye can direct as being best calculated to answer the purpose of drainage. There are few minute particulars in the management of a farm that more clearly denotes general attention or neglect, in the conduct of the farmer, than this now under review. If a traveller observe a farm well water-furrowed, and the head lands cut through, so that the water may have free passage in case of any sudden flood, he may be satisfied, without



out further inquiry, that the farmer is attentive, and that if he fail in reaping good crops the fault is not owing to his general management. If, on the other hand, water be seen lodging in every furrow, and no pains or labour bestowed to remove it, the farmer may be set down as a sloven, and as one who is careless of the consequences that may be expected to result from mismanagement; and yet it is astonishing in how few districts it is considered as a necessary part of the farmer's business to water-furrow his fields after they are sown and harrowed. How little in general do farmers seem to consider, that saving a little money or labour in the performance of so necessary a work is the worst sort of economy! The neglect of this branch of the due cultivation of the soil often hazards a crop, even in seasons not uncommonly wet, and must therefore be considered not only an improper saving, but one which, in nineteen instances out of twenty, is attended with very bad consequences.

Could it be supposed, that every British farmer, entitled to assume the name, were not fully acquainted with the advantages that result from draining, it might be proper to enter into a particular enumeration of them; but this would answer little purpose. Water is essentially necessary to vegetation, and is, by philosophers, reckoned a chief ingredient in the food of plants.

plants. It is at the same time well known, that a superabundance of water is a great impediment to vegetation, and that it is the mean frequently of injuring, and sometimes of destroying, the most valuable of all plants, the corns and grasses. The climate of Great Britain is naturally moist, and a superabundance of water in the soil is of course the consequence. To remove this bar to the production of good crops, becomes therefore equally the duty and the interest of every farmer. The advantages resulting from a due attention to this important branch of husbandry are obvious. Pasture fields, in place of producing only coarse sour herbage, intermixed with aquatic plants, which no animal will eat, may be made to yield fresh, sweet vigorous grasses; while tillage-lands may be rendered so much more productive, as that the first crop will fully repay the expence of thus laying a solid foundation for permanent and substantial improvement.

CHAP.

## CHAPTER XXVI.

*The best and least expensive Methods of forming  
Embankments.*

THE embankment of extensive tracts of fen country, as those in Lincolnshire, Yorkshire, and many others in various parts of England, falls more properly under the direction of engineers than of farmers ; we shall therefore, for the present, leave such undertakings to be managed, or, as is too often the case, mismanaged, by that description of people, and proceed to point out such means as, if used in proper time, are most likely to guard those who possess farms bounded by rivers, from the losses they may otherwise sustain in consequence of their situation beside so dangerous neighbours.

Farms situated along the banks of rivers are very liable, owing to that circumstance, to be injured in various ways ; and it will naturally occur to every attentive farmer, that danger is to be apprehended,

*1/2,*



1<sup>st</sup>, From part of the soil being carried away in times of flood.

2<sup>dly</sup>, From rivers overflowing their banks.

3<sup>dly</sup>, From rivers in times of flood flowing back into the channels of the rivulets and streams that conduct the water from the more elevated and distant grounds to the rivers, whereby these rivulets and streams are made also to overflow their banks.

1<sup>st</sup>, The danger of the soil being carried away in times of flood, is increased or decreased according to circumstances; as, the form of the banks, the nature of the soil, the rapidity of the river, and the quantity of water that lodges on the margins of the banks, or falls over them into the river.

When the banks of a river are perpendicular, especially if the soil be of a rich mouldering nature, the danger of part of them being carried away by floods is much greater than when they slope gently from the surface of the field to the bed of the river. When that is not the case naturally, they ought to be moulded into that form by art; as when a river, in place of being confined in its progress, has a power of efflux and reflux, the damage to be apprehended is inconsiderable, compared with what is likely to happen,

pen, when, being restrained within too narrow limits, it is constantly struggling for an extension of space. When the soil is a rich free mould; and the under stratum, opposite to the greatest force of the water, sand or gravel, this struggle never fails to be attended with bad consequences.

If the soil and subsoil be one entire mass of clay, or strong loam, and the current of the river do not press more upon one part than another, a most substantial improvement may be effected by sloping the bank, so that the declivity may be one foot in three or four, from the surface of the field to the bed of the river. This some may object to, as sacrificing a certain portion of valuable land; but it should rather be considered as a premium paid for the insurance of the remainder, than as a total loss. If gravel mixed with small stones, can be conveniently procured, spreading these materials on the sloping bank, to the depth of eight or ten inches, and till beyond the flowings of the river, will prove a good security against further damage; and if the bank be planted thick with any sort of willow, especially the Dutch willow, it will, in a short time, become an impenetrable fence, while the annual cuttings of wood will soon be equal to the heritable value of the land thus apparently sacrificed. Where no gravel can be procured, the new sloped bank should be immediately covered with well swarded turf, which should be

pressed down as hard as possible, either with the back of a spade, or with wooden mallets. If this be done in the beginning of summer, and willows be planted the following autumn, the improvement will be both effectual and permanent. In case the river run with extraordinary violence against any one particular part of the bank, it may be necessary to make a fence or bulwark of stone in the front of that place; the best way of doing which is, in place of building a wall, to drop the stones in a careless manner, but so as they may lie close together on the sloped bank. This is a much more secure mode of fencing, if the bank be made with sufficient declivity, than any stone wall that ever was built for the purpose; and while it is the most secure, it is also the least expensive; but care should be taken to lay the stones all the way from the bed of the river, till considerably beyond where the river flows in common.

Where the soil is of a strong adhesive nature, and the under stratum is sand or a pebbly gravel, it becomes in a much greater degree necessary to slope the banks. The water, when rushing violently along, has a powerful effect in undermining the bank, and carrying off these incoherent substances; so that the soil, having nothing to support it, naturally gives way, and frequently in such quantities as to occasion very serious losses both to proprietors and tenants. In all such



such cases, the slope should be made much more gradual than when the soil and subsoil is of the same quality, and such as will nourish aquatic plants. The banks having been sloped according as circumstances require, a thick coat of gravel, mixed with small stones, where such can be procured, should be laid on, so as to form a kind of natural beach, over which the river, when in flood, may have power to extend itself at pleasure. Should it be difficult or impossible to procure such materials as are proper for forming this best of all defences, strong thick sods should be placed on the surface, in the manner before directed, which, if laid on in spring, or nearly in summer, will have time to unite, and to become one compact body before the autumnal floods (which are those whence the greatest danger is to be expected) begin to flow. If the subsoil be of such a nature as that willows will not grow, such sods as are full of the roots of rushes should be made choice of in preference to all others; as when these plants thrive and spread over the surface, it becomes in a great degree impenetrable by water, even in great floods, and when the river runs with considerable violence and rapidity.

The directions above given will be found more or less practicable and useful, according as the river on ordinary occasions runs with greater or less rapidity. In level, or nearly level districts, all that is necessary, is to secure full scope  
for

for the rivers to overflow their usual bounds without interruption ; when that is secured by either of the methods before mentioned, floods, unless very violent, seldom do any material damage to the banks of rivers in such situations. It becomes, in many cases, extremely difficult to fence rapid running rivers, in such a manner as to prevent part of the banks from being carried away by inundations. Sloping the banks would be attended with no good consequences. Even strong bulwarks made of stone, are often swept away by the overpowering flood. The writer has seen a method of fencing the sides of rapid running rivers adopted with success, after several other attempts had failed. It was by means of large baskets, provincially, " creels," formed of hazle, willow, &c. into a kind of open network ; which, being placed along the bottoms of the banks, were filled with stones. This is a very simple, and by no means an expensive expedient ; and as these baskets may be made to contain two or three tons of stone, it can only be on few occasions, and in very particular situations, that a basket containing such a weight can be displaced or carried away. Such a mode of fencing as that now mentioned, the writer is perfectly satisfied, would prove effectual in many parts of Scotland and Wales, where the rivers run with uncommon rapidity.

Owing

Owing to inattention, or rather to not being aware of the consequences, much damage is often done to the banks of rivers in level districts, especially if the banks be perpendicular, and of a considerable height, by allowing the land-floods to fall over them into the river. As the water from the furrows approaches the bank, it is frequently stopped in the furrow of the head-ridge, which becomes for a time a kind of reservoir; the consequence of which is, that a considerable proportion of the water sinks and filters through the earth, which being thus softened and swelled, is more easily undermined and carried off by the river. Sometimes little cuts or openings are made from the furrows across the head-ridge, for the purpose of conducting the rain-water into the river; here again the consequences are equally bad. Whoever will examine the bank of a river where this mode of management is adopted, and it is very common, will observe, that at every one of these cuts or openings a little creek is formed, in consequence of the bank having been more softened, and by that means having become a more easy prey to the river when in flood. To prevent these evils, it is necessary, besides sloping the banks, to devote a part of the lands adjoining, to the breadth of twenty or thirty yards, for instance, either to pasturage, or the growth of trees; and to form a drain at a proper distance from, and parallel to, the



the bank, for the purpose of collecting and carrying off the water from the furrows. Were this done, and were the water from this drain conducted into the river by conduits, formed a little above its ordinary level, much land, which is annually lost by neglecting this simple precaution, would be saved.

2dly, Injuries, although of another nature, are often sustained by farmers from rivers overflowing their banks. Sometimes the farmer is prevented from sowing his fields; at other times, the crops of grain and grass are greatly injured, by being covered for a considerable time with water; and at others again, the whole produce of the year, the hay and corn-crops, are swept away. To prevent evils so complicated, and so serious in their natures, is certainly the business of every man, who, from the situation of his farm, has reason to apprehend, that, without using proper precautions, he may be subjected to such visitations. These damages can only happen in level tracts, where the banks of the rivers are low, and where the course is not of sufficient breadth to contain the water in time of flood. Some people, although very improperly, raise mounds of earth close to the top of the bank, and of a height exceeding that to which the river can be expected at any time to rise. These mounds, from being placed so near the river, are unable to resist the pressure of the water;

ter; and, by giving way, frequently admit a current into the fields, which proves much more injurious in its course than if no mound whatever had been erected. Were a mound of earth formed on the side of the drain proposed to be made for carrying off the land-water, and were that mound well sloped on the side toward the river, it would be the most secure and effectual guard against rivers doing injury to the adjoining lands of any that could be adopted.

By these mounds being placed at a distance from the river, the force of the stream would be much lessened, and the natural boundaries of the river greatly enlarged; as, in proportion as the mounds are removed from the centre of the current of the river, in like proportion will they become more secure, as being less liable to violent pressure. The propriety of erecting these mounds at a proper distance must therefore be sufficiently evident; as when mounds are erected near the top of the bank, which can only be owing to ill-judged parsimony, they form, as it were, a part of the bank, and are liable to be undermined and swept away. Whereas, when they are placed at the distance of twenty, thirty, or forty yards, they serve rather as a boundary to confine the overflowing water, which glides along the bottom, than as a barrier to prevent the encroachments of an impetuous river.

3dly,

3dly, Farmers, who possess lands in low situations, often sustain damage from rivers, in times of flood, by their flowing back into the channels of the rivulets and streams that conduct the water from the more distant and elevated grounds to the rivers, whereby these rivulets and streams are made also to overflow their banks. The only precaution that can be adopted in such a case, or at least the one which appears to have the greatest probability of answering the purpose, is to erect mounds at a distance from the banks, and of a size proportioned to the quantity of water which, from the cause now mentioned, may be supposed at any time to stagnate in these channels. This may be done at a very trifling expence, either in money or land. If the proprietors do not chuse to ornament the country, and improve their own estates, by planting trees on the borders of these rivulets and streams, the farmers may so construct these mounds as that they may become fences to their arable fields, while that portion of the farm, necessarily and properly cut off for the protection of the remainder, may be devoted to pasturage.

Whether the right or title which a proprietor ought to possess in regard to altering, widening, or deepening the course of a river, be fully established, or to what extent, the writer does not know. But one thing is certain, viz. that many expensive and vexatious litigations, between those  
who

who  
often  
propri  
ment  
above  
were  
gener  
the o  
so mu  
ses.  
priet  
from  
being  
ces,  
wher  
sides  
be o  
be in  
as, w  
in de  
place  
triflin  
dered  
pastu  
Th  
ly ag  
distr  
corn-  
choic  
bably  
Vo



who possess lands on the opposite sides of rivers, often take place, in consequence of one of the proprietors endeavouring to effect the improvement of his estate by one or other of the means above mentioned; which might be prevented, were proper regulations established, and made generally known. This is one, although not the only cause, why rivers are permitted to do so much damage to lands adjoining to their courses. Inattention or neglect on the part of proprietors is also another cause why this evil is, from year to year, allowed, without any attempt being made to check it. There are many instances, especially in the Highlands of Scotland, where gentlemen, who are proprietors of both sides of the river, allow extensive meadows to be overflowed after every fall of rain, so as to be in a great measure rendered useless; whereas, were a little attention and money bestowed in deepening the bed of the river in particular places, which could often be done at a very trifling expence, these meadows might be rendered valuable for tillage, but particularly so for pasturage.

There is nothing that operates more powerfully against the general drainage of any particular district of country, than the manner in which corn-mills are frequently placed. An improper choice of the situation of a mill, although probably favourable for the proprietor, is ruinous

to the possessors of the low-lying land adjoining. For, according to a remark made by the writer, in his Report of Northamptonshire, although not particular to that county, these mills are generally placed in the worst possible situations; as, in place of being erected on the sides of the meadows, and supplied by leads or cuts from the main body of the water, they are built on low ground, and every miller has the command of the whole river, by which means an obstinate man has it in his power, in time of flood, to injure his neighbours with impunity, and that too without in any material degree benefiting himself.

CHAP.

T  
ed,  
know  
the t  
Virgi

Lo  
W

In  
were  
and  
remo  
could  
after  
ment  
pare



## CHAPTER XXVII.

*Paring and Burning, &c.*

THE practice of paring and burning, or burn-breaking, or, as it is in some places called, "Devonshiring," seems to have been well known to the ancients, as may be inferred from the two following lines of Pope's Translation of Virgil's Georgics:

Long practice has a sure improvement found,  
With kindled fires to burn the barren ground.

In the first ages of agriculture, when woods were to be cut down, shrubs to be grubbed up, and large stones and other incumbrances to be removed, the plough, if it was then introduced, could only have been made to act with effect after the ground was cleared of these impediments to cultivation. Where, in order to prepare land for the reception of the seeds of plants  
useful



useful for man, it became necessary to fell the trees, and to grub up the under wood, shrubs, and rank weeds of every kind, such operations could have been performed only by manual labour; and as paring and burning was the chief mean that could have been adopted, for reclaiming lands in such a state, it is not surprising that that method of improvement should in such circumstances have been introduced. As this method of preparing the soil for the production of useful crops is still known by the name of Devonshiring, it gives reason to found a conjecture, that the county of Devon was that part of the island where the first emigrants from the Continent settled, and that paring and burning was then, and owing to that circumstance, introduced at an earlier period into that part of Britain than any where else.

Paring and burning is a mode of management, (whether of improvement, except in certain cases, remains, in the writer's opinion, to be proved), pretty commonly adopted in nearly one half of the counties of England and Wales. It was also a practice very common in the Highland parts of Scotland; but of late years, the proprietors of these districts have, as if by general agreement, set their faces against it; and the instances may be said to be very rare, where, in that kingdom, the use of this mean of rendering lands

lands less difficult of cultivation is now permitted.

In performing the operation of paring, or of separating the sward from the soil, several instruments are used in one part or other of these kingdoms. That which is the most ancient, is a kind of curved mattock or adz, about eight or ten inches long, and five or six broad; and which, by its form, appears better adapted for cutting up the roots of brushwood, furze, broom, or other shrubs, than for paring off the surface of a field free of these incumbrances. This instrument is, however, common in the south-west parts of England; and although it no doubt retains, in a great measure, the shape of these instruments, which were first used for the purpose in that part of the country, when the lands were in a very different state, yet the labourers who are in the practice of using it are able to pare off the sod with great dexterity and dispatch. In such other parts of England where the sod is also pared off by manual labour, the ordinary breast spade, in some places called the breast-plough, (in Scotland the *slaughter-spade*), is generally used. The iron or cutting part of the breast or paring spade, is about eight or nine inches long, and from ten to twelve broad, with sometimes a kind of edge rising up a few inches at the right hand side, which is intended for the purpose of cutting the side of the turf

turf next to the unmoved sward. This instrument, which is formed with a fine edge, a man forces forward by the strength of his arms, and by pressing his breast against that part of the frame or shaft which he holds in his hands. In working this spade, the labourer cuts the fods at about an inch or an inch and a half thick, and from ten to twelve broad; and when the spade has run under the sod or furrow to the length of about three feet, he throws it off, by turning the instrument to one side; and proceeds in the same way cutting and throwing over the fods the whole length of the ridge.

The only other instrument used for paring the sod, is the horse-plough; but of different constructions. In some parts of the west of England, the common plough only is used. There the old grass-fields, when it is proposed to burn the sward, are rib or flob furrowed, (in the manner described in vol. ii. p. 289.) about the beginning of winter; and being again cross-ploughed the following spring, the fods are collected, and managed in a manner different from the common method, and which will be afterwards described. In the fenny districts on the east coasts, where paring and burning is practised on a large scale, they have ploughs of a particular form constructed for the purpose. These vary from the common ploughs, chiefly in the breadth and sharpness of the share, or sock, and are admirably



mirably calculated for paring off the sward or sod of a field that is level, and where no stones, brushwood, and hills, or other impediments, obstruct its progress; but where that is the case, the breast-spade, or common team-plough, with a small alteration of the share, will be found entitled to a decided preference, in respect to the extent of ground that can be pared, and the superior manner in which the work in fields so incumbered can be performed.

April, May and June, are the months in which the greatest quantity of land is pared and burned; the particular period depends much on the state of the weather, and the farmer's intention in regard to the crop to be afterwards cultivated.

For accomplishing a work of this nature with the greatest dispatch, and also with the least trouble and expence, a dry season is obviously the best. The prudent farmer seldom embarks in the undertaking, unless there be a reasonable probability of his accomplishing it while the weather keeps dry and favourable. The beginning of June, when the hurry of the spring seed-time is over, and when numbers of hands can be most easily procured, may, upon the whole, be considered in every respect the best and most convenient season.

The crops that are made to succeed paring and burning are various; and, as has been observed,

served, the season for performing the operation, must depend in some measure on the farmer's choice of the species of seed to be sown. If barley or oats, for instance, be to be sown, the paring and burning must be completed as early in spring as the season will permit. When rape or turnips, which are the most prevailing crops in such cases, are to be cultivated, the end of May or the beginning of June, is the most proper time; and when lands are pared and burned as a preparation for a crop of wheat, July, or even the beginning of August, may answer in favourable seasons.

In the management of the fods after they are separated from the soil, there is also considerable difference. This arises from the different methods adopted for performing the operation.

When the land is rib-furrowed, which in Cornwall and Devon is called "skertering," it is allowed to lie some time, that the grass and weeds may rot. The field is then cross-ploughed, and afterwards harrowed and rolled repeatedly, till a great part of the earth is separated from the grassy parts of the fods. These are then collected together by hand, or with iron-headed rakes of a particular construction; and being put into small heaps, are immediately burnt. The particular method of doing which, it is unnecessary to detail, as the practice is well known,

not

not only in these counties, but in every other where imperfect husbandry prevails.

Many farmers in various parts of these kingdoms, who are too indolent, or too ignorant, to cultivate their lands in a proper manner, are obliged, in the course of preparing their fields for barley, to adopt nearly the same method to extirpate the weeds as that above described. It is therefore the name "skerting and beat-burning," rather than the method of performing the operation, that is peculiar to these counties. Many people, in the northern parts of Scotland particularly, are annually employed in skerting and beat-burning, while, were they asked what they were doing, they would answer, "collecting and burning the weeds and clods."

When the fods are pared off with any of the other implements above mentioned, they are immediately set on edge to dry. In order to prevent them from falling over, they are usually placed in a serpentine direction, which effectually prevents it. As soon as they are in a condition for burning, which happens sooner or later, according to the nature of the soil, the quantity of sap in the fods, and the state of the weather, they are put into heaps to be burned. This is done in England in various ways, which it would be tedious to mention; but as, in very many instances, it is done in an improper manner, it may tend to the information of those who con-



sider sod-burning as an essential part of good management, to peruse the celebrated M. du Hamel's very accurate account of the manner in which that operation is performed in France.

"In forming the furnaces, they begin with forming a sort of cylindric tower, of betwixt three and four feet diameter. As the walls of this little tower are made of the turfs, their size determines the thickness; but in building them they always lay the grass downwards; and they make a door about a foot wide on the windward side. On the top of this door they lay a large piece of wood, which serves as a lin-  
tel. Then they fill the inside with small dry wood mixed with straw, and finish the furnace by making a vault of the same turfs like the top of an oven.

"Before the vault is entirely finished, they light the wood that fills the furnace, and then immediately close up the door with turfs, and stop the opening that was made at the top of the vault; taking care to lay turfs on all the places where the smoke comes out too plentifully, just as the charcoal makers do; for without that precaution the wood will consume too fast, and the earth not be sufficiently burnt.

"If you were to cover the furnaces with earth, all the crevices being too closely stopp'd, the fire would be extinguished; but by using

only

"only turfs, and always laying the grass down-  
wards, there is air enough to keep the fire  
burning.

"When all the furnaces are made, the field  
seems covered with little hay cocks ranged in  
quincunx's; but you must watch the furnaces  
till the earth is red hot, to stop with turfs any  
cracks that may happen, to repair such as may  
be in danger of falling, and to light again such  
as may be extinguished.

"When the earth seems all on fire, they want  
no farther care; even rain itself, although be-  
fore much to be feared, will not hinder their  
being sufficiently burnt; so you have no-  
thing more to do, but to let them go out of  
themselves.

"At the end of twenty-four, or twenty-eight  
hours, when the fire is extinct, all the heaps  
are reduced to ashes, except some of the tops  
that will remain not sufficiently burnt, they  
not being enough exposed to the action of the  
fire; and it is for this reason, that we advise  
not to make the furnaces too big, because the  
walls being proportionally thick, the outside  
of the turfs will not be done enough, when  
the inside is overdone; for, if you burn them  
like bricks, they will not be fit for vegetation:  
Besides, in making large furnaces, you will  
have too far to carry the turfs.

"When

“ When the furnaces are cooled, they wait  
 “ till it rains, and then spread the burnt earth as  
 “ soon as possible, leaving none on the spots  
 “ where the furnaces stood ; which, nevertheless,  
 “ will produce finer grain than the rest of the  
 “ field : For which reason, they leave only such  
 “ turfs as are not burnt enough on those spots \*.”

The turfs or fods being reduced to ashes, the farmer's next object is to have them carefully spread over the surface of the field. This is done with as much expedition as possible, after the fires are extinguished ; it being considered a necessary part of good management to prevent the valuable particles of the ashes from being exhaled, by lying exposed too long to the influence of the weather ; and, for the same reason, the field receives a shallow ploughing immediately after the ashes are spread. Those farmers who are more than ordinarily attentive in this respect, only rib or flob-farrow the field, so that the ashes may be got covered up with the greater expedition and dispatch. The soils that have been formerly under cultivation, most proper for paring and burning, are those of a cold or a wet clayey nature, such especially as produce aquatic plants, or where ants chuse to take up their abode. Light friable soils are every where considered unfit for being treated in this way ; but on any sort of soil which had not be-

fore

\* Mill's Practical Treatise of Husbandry, p. 46.



fore been reclaimed from a state of waste, and where furze, broom, brambles, ferns, rushes, &c. abound, these operations, when properly performed, are productive of the most beneficial consequences. There are few points that have been more controverted, than whether paring or burning is a beneficial practice, or the contrary. There is perhaps no other method that could be devised so well adapted for preparing land, in a state of nature, and incumbered with brush-wood, rushes, &c. for valuable crops with expedition and certainty; and on that account, paring and burning might well be considered by Virgil, and other ancient writers, as sure means of improvement.

That, in such cases, they are so at this day, may be proved by the concurring testimony of those to whose lot it falls to cultivate the common or waste lands in many of the new inclosed parishes in England.

Instances the writer has repeatedly seen of the greatest advantage resulting from this mode of management; and wherever land is rendered unfit for cultivation, by the incumbrances before mentioned, the Devonshire mattock, and the paring spade, may be used with the greatest propriety. Thus far the writer is disposed to go with those who applaud paring and burning as the greatest of all modern improvements, and of which Mr Young thus writes:

“ Whatever

“Whatever objections have been made to the husbandry of paring and burning, have either been the result of theoretical reasonings on false principles, or else founded on facts furnished by very bad farmers \*.”

In respect to paring and burning, without relation to the antecedent or posterior management of the land, there seems little reason to believe that it is attended with the bad consequences that some people are apt to suppose. It has been maintained very strenuously, that the action of fire tends to lessen the quantity of soil. This can only happen to any degree from mismanagement in conducting the process of burning, and that too in particular soils. All soils must, for a time, be lessened in bulk to a greater degree by paring off the surface, and reducing it to ashes, than by the ordinary methods of cultivation; as although weeds may be completely destroyed by summer-fallow, or by horse and hand-hoeing, yet as the most minute particles of soil imbibe a certain portion of moisture, that which is not subjected to the action of fire must be greater than that which has been in a kind of furnace for twenty or thirty hours.

In this view, the soil of a field that has been pared and burned, must be lessened in bulk or depth,

\* General View of the Agriculture of the County of Suffolk, p. 31.

depth, till such time as the ashes are incorporated with the other soil, and again distended by the moisture which they imbibe; but this decrease in the depth of the soil can only take place for a short period; and as those who are in the practice of paring and burning, are in the practice also, in general, of exhausting the lands immediately afterwards, by a succession of severe crops, there is no reason to fear that the decrease in the depth of the soil, arising from the destruction of the weeds, will be of long continuance; as, in a short time, the rapid increase of their roots and fibres will soon raise the surface to its former level. Clay soils are much more apt to be reduced by paring and burning than any others. When the flame in the heaps is allowed to burst out with great violence, the soil is apt to be reduced to a bricky sort of substance, incapable either of imbibing any quantity of moisture, or of again becoming useful in promoting the growth of plants; hence, in so far as mismanagement takes place in this respect, in so far is the depth of soil permanently lessened. But, were paring and burning to lessen the soil to the degree which some people assert, there would not have been an inch of soil in the counties in the south-west part of the island many ages ago. This argument, therefore, against paring and burning, does not appear to carry much weight along with it. It is, no doubt, very specious and



and plausible in theory; but the practice of ages has proved it, in a great degree, ill-founded.

That paring and burning is an expeditious method of reducing lands to a proper state for producing crops, and that a large quantity of valuable manure is also thereby procured, are arguments always used by those who wish to impress the public with a favourable opinion of this mode of management. There is no question but both these facts are well established; but they ought only to be admitted as solid arguments to establish the general point in a certain degree.

The permanent advantage of paring and burning, in regard to the acquisition of manure thereby procured, is extremely doubtful; as although it operates as a stimulus, and creates an unnatural, because a violently forced, exertion for a season or two, yet its effects, especially if frequently repeated, prove ultimately ruinous, as has been found in very many instances. There appears therefore, no substantial reason for asserting, on the one hand, that paring and burning has the effect to reduce, in any perceptible degree, the depth or quantity of the actual soil, at least for any length of time, and it is equally clear, on the other, that land, in a proper state of management, can be made to produce, for a term of years, much more valuable crops by ploughing,

ploughing, harrowing, and the application of manure in the ordinary way, than can be forced from it by the application of fire, which, like a very powerful medicine, improperly applied, is more likely to kill than to cure.

Admitting that paring and burning is in many cases the best, the most expeditious, and, upon the whole, the cheapest way in which waste lands can be improved; and that, under proper management, it may rather be considered as an uncommon method, than as one either greatly beneficial or prejudicial to the soil, let us inquire wherein consists the necessity or propriety of the general establishment of this practice, by some so strongly recommended. By this inquiry, taken in conjunction with what has been stated, we shall be able to determine, whether it is on account of the utility of the practice itself, or to the imperfect state of husbandry in those districts where it is adopted, or where the introduction of it is recommended, that it is denominated, when properly managed, "the most admirable of all improvements."

Every person must admit, that the necessity of paring and burning old cultivated lands implies previous neglect or mismanagement; as lands under a proper course of cultivation, and of general management, can be rendered fit for yielding large crops by the more simple and less expensive operations of the plough and the harrow.

Paring and burning is recommended only in an especial manner, as means of improving cold four pastures, abounding with aquatic plants, or such as are over-run with furze, broom, fern, ant-hills, &c. In other words, for such lands as from the imperfect system of husbandry adopted, or the absurd policy of the landlords in debarring their tenants from breaking up these pastures in proper time, are in some measure returned to a state of waste.

However much it may surprise those who have had no opportunity of making this the subject of investigation, and however low it may sink English husbandry in the opinion of the reader, yet it is unquestionably true, that a very great proportion of the best, and naturally the most fertile of the old inclosed lands in England, that have been long occupied as pasturage or grass-lands, are comparatively waste and unproductive, and stand as much in need of improvement, either by fallowing, or by paring and burning, as the wastes and commons in the more level parts of the kingdom. In proof of this, it is only necessary to quote the report of the process of paring and burning made by the Secretary of the Board of Agriculture, as practised in Suffolk. "In these fens (the fens of Suffolk) the original surface is rough and unequal, from great tufts of rushes, &c. called hassocks. Some persons cut them with spades, at the ex-  
" pence



“ pence of five or ten shillings the acre ; others  
“ with the plough. Paths for the horses were  
“ in that case to be cut by hand, and the plough  
“ made on purpose, and called a Haslock Plough.”

But from so respectable authority, it would scarcely gain general credit, that in those times some of the most valuable lands in the island were allowed to return so nearly to their original state, as to require manual labour to precede the plough. It must also be observed, that this account does not apply to Suffolk alone ; it is a description also of the actual state of much valuable land in other parts of that kingdom. This circumstance, when explained, accounts in a very satisfactory manner for paring and burning being recommended so often and so strongly, as means of improving lands that had been formerly in tillage. For the reasons already mentioned, paring and burning seems the best, indeed the only method that can be adopted for bringing such lands into a proper state for cultivation. But on what principle proprietors permit their tenants, after paring and burning, to exhaust the soil by overcropping, and then to allow it to remain neglected till it becomes equally waste and unproductive as before, it is impossible to determine. Such a practice is evidently beneficial for the tenant, but must be injurious to the landlord ; for, in the language of some districts, where paring and burning is common, “ however good

“ it

"it may be for fathers, it is certain ruin to sons."

From the above account of the imperfect, or rather absurd manner in which a great share of the old pasture-lands in England are managed, may be inferred, that paring and burning is recommended, because it is really the only, as well as in the opinion of the advocates for it, the best means that can in such circumstances be adopted. Fallowing, by which lands of a light friable nature, when the brushwood and other shrubs are removed, might be easily reduced to a pulverised state, will not, without much time and labour, prove effectual for reducing strong adhesive soils, the surface of which is matted together by the roots of rushes, and other aquatic plants. That being the case, the possessors of such lands are under the necessity of using the means adopted by the first improvers; and where lands are allowed to remain so long in grass, as to be overrun with farze, rushes, &c, paring and burning must still hold their ranks in the list of essential means of improvement. But let it be remarked, in the words of a provincial writer on agriculture, who seems to be fully satisfied, from experience, of the ruinous consequences resulting from repeated parings and burnings, "that if this practice should be at any time *necessary*, in order to get free of a variety of coarse productions which cannot be subdued by any other means,

it

it should ever after be abandoned, as being a practice highly prejudicial to a farmer's interest, *and one that has idleness and sloth for its parent, and poverty for its offspring\*.*"

Were lands cultivated and managed in the manner that would render them to the greatest possible degree productive, (in alternate courses of grain and grass-husbandry), the operations of paring and burning would be rendered unnecessary, *and if not impossible, at least extremely difficult* to accomplish, as the sward or turf of a field that had been sown out with grass-seeds in high condition, and free of weeds, would be so tender, as scarcely to have toughness sufficient to keep it together while undergoing the operations of paring, setting, &c. Mr Young, in a letter to the Secretary of the Bath Society, on the beneficial consequences of introducing turnip crops, to the exclusion of fallows, remarks, that as improvements take place in the western counties, summer-fallowing oftener than common, will be esteemed an improvement; and adds, "an improvement with which the farmers in that part of the island, like those of Scotland, may sit down satisfied †." It was formerly observed, that many of the proprietors of Scotland had got a stage beyond fallowing, on the road towards perfection

\* See Report of Lincolnshire, p. 69.

† Bath Society's Letters and Papers, vol. ii. p. 64.



perfection in agriculture, by covenanting with their tenants, to substitute horse and hand-hoed green crops, in place of fallow. It was also remarked, in the former part of this section, that the practice of paring and burning, was almost universally exploded in that kingdom. It may here be proper also to remind the reader, that except around the houses of the proprietors, there is little or no old grass lands in the better cultivated parts of Scotland, over-run with shrubs, weeds, and ant-hills. This remark is not made with a view of placing the general agriculture of Scotland in a superior point of view to that of England; but in order to show the good consequences that would necessarily result from an alteration of the present mode of managing grass-lands in the latter kingdom, by which only paring and burning, like fallowing, can be exploded with propriety.

In the Carse of Gowrie, than which there is not a district in the Island where tillage, and every thing that respects the cultivation of grain, is better understood, or more judiciously performed, the system of outfield and infield husbandry was universally established, within the memory of many persons now living. Then hassocks, rushes, and all other weeds that prosper in cold wet soils, were to be found in abundance in all the outfields, which under that system, were only broken up, for a crop or two,  
every

every eight or ten years. Now the case is materially altered for the better; those impediments to good cultivation have disappeared. ~~The distinction of outfield and infield, has sunk~~ into oblivion. The rents are in many instances tripled. Valuable crops are annually produced; very many of the tenants are in an easy state of independence; and all this has been effected by the simple operations of the plough, and of the harrow, and without having had recourse, but in very extraordinary cases, to paring and burning.

In short, it is not the excellency of the means, nor the permanent advantages derived from the use of them, but the erroneous system under which the old pasture-lands in England are managed, that renders paring or burning necessary, or, when repeated, at all excusable; and when as great an alteration in that respect, shall happen in that kingdom, as has taken place in the Carse of Gowrie, paring and burning, like infield and outfield, will become obsolete terms.

## CHAP.

## CHAPTER XXVIII.

*Irrigation, or the Watering of Land.*

**H**AVING taken up so many pages in describing the various methods by which lands may be freed from superabundant water, arising, either naturally from the bowels of the earth, or spreading over the surface by the overflowing of rivers, it may appear surprising to some that the writer's next object should be to direct the farmer's attention to the proper methods of bringing water over those fields by art, which may be supposed to have required so much art as well as expence to have made dry.

The beneficial practice of watering or flooding land by artificial means, has been established in some particular districts, as Wilts, Hants, Devon, Dorset, &c. for many ages, at least beyond the period that memory or tradition reaches.

The idea must no doubt have been first suggested, or the theory formed, from observing the effects of the operations of nature in this respect.



These are no doubt more conspicuous in other countries than in this. Whoever has heard of the remarkable fertility of the lands of Egypt, must also have been informed, that it chiefly arises from the annual and regular inundation of the Nile. That river (during flood) after traversing immense territories in its course, with inconceivable impetuosity, at last diverges gently over the plains of Egypt, depositing there the valuable particles of vegetative earth which it washed away from the adjoining lands in the course of its passage. In this country the duration of the floods is so short,—the courses of the rivers for the most part are through such barren and unproductive tracts,—and the soil and climate are so inferior,—that effects similar to those discernible from the overflowing of the Nile cannot be expected to take place. But that person must indeed be a superficial observer of nature, who has not discovered that vegetation is earlier, and the crops of grass more abundant, on the margins of streams and brooks that are occasionally overflowed, than on those parts of the same field that, from their more elevated situation, or greater distance from the water course, partake not of the fertilizing benefits which water gliding over grass land, with some degree of swiftness, is known to impart.

This circumstance having caught the attention of some farmer more observant than his

neighbours, was most probably the first cause of endeavouring to effect, with more certainty and success, by art, what nature on many occasions performed very imperfectly; and was the means of giving rise to the introduction of what may be called, Artificial Water Meadows.

In China, the artificial watering of land is said to be carried on to such an extent, and to produce such beneficial effects, as we in this country can hardly form any idea of. In some of the West India islands, also, and in the southern part of North America, this practice is very generally established: The sugar canes and rice fields are regularly and abundantly watered by art, when, from the failure of the periodical rains, the crops are in danger of being injured.

Before describing the method of performing this operation, many particulars connected therewith require to be explained; as,

I. The Lands capable of being watered.

II. The Soils proper for being watered.

III. Preparations necessary previous to introducing water on Meadows.

IV. The different sorts of water that prove more or less useful for watering Land.

I. The Lands capable of being irrigated,—it will occur to every reader, are those that lie in low situations, adjoining to rivers or streams, or in a sloping direction on the sides of hills, to which water can be carried by a lead or drain, from a river, stream, or spring, running in a more elevated channel, at a little distance. The former are denominated *Flowing Meadows*, the latter *Catch-work Meadows*.

II. The Soils proper for being watered.—All soils are not equally benefited by irrigation. Those that are of a sandy friable nature are the most proper, as the improvement is not only immediate, but the effects more powerful than on other soils. Strong adhesive sour wet soils, such as are most prevalent in the neighbourhood of large rivers, are also capable of being improved by watering; but the effects are neither so soon discernible as on those before mentioned, nor will the watering of such lands prove so profitable to the farmer, (whatever it may do to the proprietor,) in consequence of the very heavy expence to which he must, in many cases, be subjected by previous draining. Another circumstance, in regard to the different soils that may be benefited by irrigation, requires notice, namely, that the more tenacious the soil, the greater ought to be the command of water. A brook or stream, capable of watering ten or twenty acres of light and naturally dry land, would



prove but in a very small degree beneficial, if applied to the watering of half that extent of cold clay soils, such as in their natural state produced more rushes than other plants. All soils of this last description require a considerable body of water for the purpose of floating them, so as to produce the wished for effect. Where that cannot be procured, this mean of improvement will in few instances answer the farmer's expectation, or turn out profitable.

III. Preparations necessary previous to introducing water on meadows.—Before attempting to improve meadows, or other lands, by the application of water, it becomes the farmer's business to ascertain, that both the soil and subsoil are either naturally dry, or have been made completely so by means of open or under drains. It is found in practice, that unless lands be thoroughly drained they cannot be improved by watering; and of course the previous operation of draining is considered indispensably necessary, before fields in which there is a superabundance of moisture can be flooded with any probability of success. As the perfection of a water meadow consists in the farmer having it in his power to bring on or take off the water at pleasure, it necessarily follows, that a complete power of drainage is as requisite as the command of water. The period which meadows are allowed to remain floated, and how often it is considered necessary

cessary to repeat the floating, depends on various circumstances, that will hereafter be explained ; but as, after every floating, the floaters, drowners, or watermen, (for by all these appellations the labourers who are employed in the operative part of the business are known,) are extremely careful to drain off the water from every part of the field ; and, as the most injurious consequences are known to arise from any degree of negligence in this respect, it would be expending money very unnecessarily to prepare a field, at a great expence, for being floated, unless it were previously ascertained that sufficient declivity or outfall could be procured, for carrying off the water, when its longer continuance would be attended with bad effects : Therefore, in forming a water meadow, the drain that is to carry off the water, when it is no longer necessary, or when its longer continuance would prove prejudicial, should be as carefully attended to, in the construction, as that by which the water is to be superinduced. The forms and uses of the other cuts, conveyances, or carriages of a water meadow, will be taken notice of when describing the practical part of the operation, and also the difference between a flowing or floating meadow, and one that is watered by what are called Catch-work drains. The next particular in order is

IV. The different sorts of water that prove more or less useful for watering land.—That water possesses different qualities, is known more or less to every person ; but in what manner it acts, so as on many occasions to produce such wonderful effects, in regard to what may not improperly be called Premature Vegetation, is more the province of the chymist than of the practical farmer to ascertain. That the qualities of the different sorts of water, as issuing from rocks, from chalk, or from swamps, and the effects of each when employed in irrigating particular kinds of soil, may in time be determined with considerable accuracy, there is no reason to entertain a doubt. Many experienced chymists of the present day are making it their study to combine chymistry with agriculture, and to such this is a wide field for investigation. Their individual labours, while amusing and instructing to themselves, may, and most probably will, when communicated to the public, tend to throw much light on this hitherto rather neglected art. There are few objects to which they can direct their attention, where that attention may be more usefully employed, than in investigating the nature and properties of the different sorts of manures, of which water, when thus applied, will be found to hold a distinguished rank. By the labours of these gentlemen, the watering, or flooding of land, may in time be reduced so completely to a system,



system, that the practical farmers of future times may be able, from the investigation, practice, and experience of others, to decide with accuracy and precision, in what situations, on what soils, and by what sorts of water, the watering of land is likely to be attended with the greatest success, and on what occasions also the attempt would be improper, because likely to prove abortive. All that is at present known with certainty, in regard to the sort of water best suited to the purpose, must be collected from the success that attends watering land in some districts beyond that in others. From what was mentioned respecting the remarkable fertility of Egypt, in consequence of the stated overflowings of the Nile, it may be inferred, That the water of rivers when in flood, must be the best of all others for the purpose, especially if their courses be through extensive fertile tracts of country, where every little stream, rivulet, and brook, adds an accession of the richest mould, which, being deposited on the surface of the meadows, cannot fail to act as manure, and to give new energy to the vegetative powers of the soil.

In regard to water issuing from springs, it was formerly mentioned, that the counties of Wilts, Hants, Devon and Dorset, are the districts where watering of land is practised to the greatest extent; and it will also be found, that there its effects are more remarkable, than in others that  
abound

abound with water arising from strata different from those prevalent in the above mentioned counties.

The hills in these counties abound with chalk, gravel, or a slaty mouldering kind of rock, containing probably a considerable portion of calcareous earth; and as the water that issues from these hills is known, from practice, to be better adapted for the purpose than what arises in the same districts from bogs, peat-mosses, or morasses, it is probable that the water in the one case is impregnated with a greater proportion of vegetative principle than what the other possesses. Without this be admitted, it is impossible to account for the difference in the effects often so visibly produced, from watering one field from a spring issuing from a chalk hill, beyond what takes place in another, similar in every respect, and managed in the same way, excepting that the water applied arises in, or flows through, a swamp or morass, composed chiefly of peat-earth; or proceeds from a hill or mountain known to contain metallic substances. From whatever cause it may arise, the fact is unquestionably established, that the water of rivers which run through comparatively level and fertile countries, is not only better than that of such as have their courses through mountainous unproductive tracts, but superior to all others.

Secondly,

Secondly, that water issuing from chalk, friable rock, or gravel, is much superior to that from swamps and morasses. And thirdly, that the water which issues from hills containing metallic substances, is, to a certain degree, destructive of the principle of vegetation, when applied to any soil.

Although the writer has seen the practical part of the business conducted in all its branches, and on more occasions than one, yet he is sensible that neither he nor perhaps any other person is able to give a particular description of it, without giving also a set of plans representing all the various parts of the works, so as the one might elucidate the other. This having been done by a much abler hand, Mr Boswell of Dorsetshire\*, some remarks on the general management shall only be attempted. These may be agreeable to the generality of readers, while a minute detail could be interesting only to a few.

*Watered Meadows*, properly so called, are flat low-lying lands, that may be overflowed by water direct from the river, or on which water may be brought in considerable quantities by

VOL. III.

3 F

a

\* Those who are anxious for particular information, in regard to the most approved method of watering land, the writer begs leave to refer to Mr Boswell's treatise on that subject, which contains more real information respecting the practical part of watering land, than probably any other in the English language.



a cut or main drain, made to conduct it from the river or stream, and which is branched off from the river, at a higher level than the surface of the meadows if flat, or of the top of the ridges, if the meadows be formed into ridges as a preparation for watering the grounds with effect. The water being conducted by a main drain or carriage, as it is technically called, to the nearest end of the meadow, it is there branched out into a number of cuts, made for the purpose, along the tops of the ridges. These cuts being filled with water from the main drain and being constantly supplied by water forced into them from the main cut, which, wherever it is possible, is made to run with a considerable degree of rapidity, they every where overflow their banks, so that a general flood ensues over the whole, or such part of the meadow as sufficient water can be procured for at once. In all the watered meadows that are ridged up, there are drains in each furrow for receiving the water that runs over the edges of the little cuts that are made on the tops of the ridges. The water, as it falls into the drains in the furrows, runs off into what is called the great tail drain, and is either made use of to water some adjoining field or reconducted again to the river or stream by another channel; so that in a very short time after the inlet or carriage drain is stopped, the field, when properly formed, becomes as dry

as

as before. To effect which, with the greater dispatch, cross cuts or drains are made from those on the tops of the ridges, so that the water from these last mentioned cuts is conducted into the drains in the furrows as soon as the carriage drain is shut.

The cuts necessary to be made on a meadow irregular in surface, and where an abundant supply of water cannot be procured, can only be determined by the skill of the flooders; but when it is remarked, that in every such case it is deemed essentially necessary that the water should spread over the whole, and as equally as possible, it may easily be conceived, that before a large quantity of water, divided into so many parts, can operate over the surface of several acres at once, these cuts must be, like the veins and arteries in the human body, considerable in number and very variously placed.

*Catch-work Meadows* are such grass and pasture lands as lie on the sides of hills, and are capable of being watered, by conducting the water of some stream or spring round the edges of the hills. The mode of watering lands so situated, is very different from the former, as fewer cuts or channels are necessary. These are cut as nearly in parallel lines, one below the other, as the level sidewise along the bank will permit. The water having arrived at that part of the main carriage, or main channel, on the top  
of

of the meadow, it begins to run over its lower side, and after overspreading all the surface in its course, falls into the channel or cut immediately below; that becoming full, in a short time runs over in the same manner, and so on, till the water at last arrives at the bottom of the field, where it falls into a drain, formed for the purpose of carrying it away to some adjoining river, or perhaps to float some low lying meadow.

As it is generally understood that the greater the slope, and the more lively the motion of the water, the more evidently will the effects of watering be discernible, one would be led to suppose that catch work watering would be superior to the other mode. Practice and experience have however proved the contrary; and those who are most skilled, and who have had the most extensive practice in the watering of land, recommend catch-work watering as a secondary mean of improvement only. The reason assigned is, that the water is so repeatedly strained over the ground, that the flooders or watermen do not consider it so enriching as before it was used. "And therefore," says Mr Boswell, whose experience and practice in the business entitles him to the greatest credit "nothing but absolute necessity can support the adopting it."\*

The

\* See Mr Boswell's Treatise on watering meadows, p. 27.



The expence of forming meadows in a manner proper for being watered with the greatest effect, is in either case considerable. In forming a meadow for flooding, there are usually so many cuts beyond what are requisite in catch-work meadows, that the first cost is very frequently more than triple; and the regular annual charge for cleaning out the cuts, and keeping the whole works in order, is also much increased. The expence of forming a flowing meadow varies, from six or eight to twenty pounds the acre; that of a catch-work meadow, from three to six or seven; and the annual expence of repairing implements and of manual labour, from five to ten shillings the acre.

The expenditure of so much money implies, that great and permanent advantages are derived from watering meadows. That this is the case when the soil and the water are both proper for the purpose, is perfectly established; although the advantage derived from watering some soils, when compared with that resulting from adopting the same means of improving others, is by every account very small; so much so, that in many cases, if the account of the expences and of the abstract benefit thus derived were fairly stated, the balance would not be great either way. Such instances however, may be considered as rare; and on that account watering meadow land may be generally said to be a material

material improvement, in every part of the island where permanent meadows are common, whether hay or pasturage be the object.

Meadows are usually watered at two seasons in the year, or rather they are watered occasionally during winter and spring; that is, from the beginning of November till the beginning of March. The length of time which water should be allowed to flow over meadows cannot be determined by any general rules. The nature of the soil, the season of the year, and the practice and experience of the flooders, can alone regulate this particular. The practice of some districts is to allow the water to flow over the fields in winter, for several weeks together, with the interval only of a day or two, now and then. In others they are floated one week, and allowed to remain dry the next; and so on for several weeks together. Sometimes the operation of floating is in a great degree suspended by frost, the whole surface being covered with one sheet of ice. When that happens, and when the frost continues for any length of time, it is observed, that the succeeding crop of grass is remarkably abundant. In spring floating, when the temperature of the water and of the air becomes more mild, a much shorter period is necessary; a few days now and then is found perfectly sufficient. But whether the water be kept so long or short, all those who are conversant in the

the

the business are agreed, that it is an indispensable part of good management to lay the meadows thoroughly dry between every watering, as without that be done half the benefit that might otherwise be expected will not ensue.

Watered meadows are usually pastured in the spring with sheep, and as the grass is remarkably forward in March and April, when no other green food can be procured, it becomes almost invaluable to those farmers who keep flocks of sheep, either for breeding or fattening. About the end of April, after being again flooded, they are shut up during summer, and the crops mown for hay. In autumn the after-grass is eat off with cattle, it being considered, and indeed found from experience, to be certain destruction for sheep if they are permitted to pasture on watered meadows for a single day at that season. A remarkable instance of this is detailed in the report of the county of Suffex, in the following words: "If wethers or ewes, before lambing, were turned in, they would certainly die. Eighty ewes from Weyhill fair were turned into some land adjoining to a watered meadow, it happened that a score of these accidentally broke into the meadow for a night; taken out the following morning, they were all kept till lambing; the score that had broke loose, produced twenty two lambs, all which lived, but every one of the ewes died: rotten before May-day; the remaining sixty made



“ made themselves fat, nor could a rotten sheep  
 “ be discovered amongst them; several of these  
 “ were put into the meadow with their lambs,  
 “ but received no injury.” Why the grass of  
 watered meadows should prove so nourishing  
 food for sheep in the spring, and such certain  
 destruction to them in autumn, the writer does  
 not pretend to determine; but that the fact is  
 so, in every district where water meadows are  
 common, is established beyond the possibility of  
 a doubt. It becomes therefore indispensably ne-  
 cessary for those who are as yet unpractised in  
 the business of water meadows, to guard their  
 flocks with the most sedulous attention from ap-  
 proaching these meadows, in the autumnal or  
 winter months.

The effects of watering meadows, in produ-  
 cing an early and luxuriant vegetation, when the  
 soil and the water are proper, and when the  
 operation is performed in a proper manner, are  
 truly astonishing. But the difference between  
 a watered and unwatered meadow, in these re-  
 spects, can best be determined by comparison.  
 Those who have had opportunities of seeing the  
 piece of ground set apart by the late Mr Bake-  
 well, for trying experiments in this branch of  
 husbandry, must at once have discerned the be-  
 nefits resulting from the proper application of  
 this mean of improvement. Had they extended  
 their surveys a little further, they would have  
 discovered,

discovered, that while the Dishly fields (none of the best in quality) were covered with an almost perpetual verdure of the most nourishing grasses, those of some neighbouring farmers were famous only for the quantity of rushes, and other weeds, which they produced.

The advantage of watering meadows, in so far as spring food for sheep is thereby procured, (a most important matter no doubt,) has already been mentioned. Another, also of material consequence, merits notice.

Besides manuring a certain portion of the farm, without being obliged to have recourse to the farm-yard, the lime-kiln, or the marl-pit, the crops are not only so much earlier, as to afford an abundant supply of food for the sheep at the most pinching season, but they are also so much greater in the after season, as, besides being useful for the other stock, ultimately to increase the dunghil; so that the other lands are to a greater degree enriched thereby. In a word, where the soil, the water, and the situation are favourable, it is a mean of improvement which every proprietor ought to encourage, and every farmer to adopt.

The exertions now making to introduce the practice of watering lands in Scotland, renders it necessary to make a few observations on the probable consequences of these exertions, or rather on the obstacles that seem to stand in the

way of the establishment of this beneficial practice in that kingdom. Those which merit most attention, are, the quality of the water; the situation of the fields; and the open-field state of that part of the country where the attempt seems chiefly directed.

If in England it be found, that the nature or quality of the water determines, in a great measure, the extent of the improvement that the using it in watering land artificially is likely to effect, the same consequences may, from a parity of reasoning, be expected to take place in Scotland. Therefore, before a general introduction of the system be attempted, it appears a necessary, and a prudent preliminary inquiry, to ascertain, by comparison, the extent of the advantages that may be reasonably expected to result. This becomes the more necessary, in consequence of the heavy load of expence that is incurred in making the pre-requisite preparations. It has already been mentioned, that in the districts in England where the practice of watering land is most generally established, the rivers, streams, and rivulets most usually employed, have their sources in hills of chalk, gravel, or sometimes in a flaty, and not unfrequently in a free porous kind of lime-stone; and that it is by water issuing from hills, whose chief component parts will answer one or other of these descriptions, that the greatest improvements



ments are effected. There is not a gentleman, proprietor of an estate in Scotland, (who has ever been at the trouble to cause any investigation be made), but must be perfectly satisfied, that, whether the water issuing from the hills in that kingdom be better or worse for the purpose, it must at any rate be different in its nature and quality from that most generally made use of in England, as proceeding from very different strata, and for the most part traversing barren, neglected, and unproductive districts. Water issuing from the hills in Scotland, generally proceeds from a stratum either of whin-stone, or of an extremely hard lime-stone, both of which are equally impervious to that element, and which of course must be less impregnated with fertilizing powers than in either of the cases before mentioned.

Another circumstance respecting the quality of the water in Scotland for this purpose, also merits attention. It is very highly probable, that although, owing more to negligence than to any other cause, there have not yet been discovered many metallic substances in the hills and mountains of Scotland, yet because that is the case, no person will pretend to affirm these do not contain immense stores of metals; if they did not, it would be extremely singular, as in almost every country so rugged and deformed in surface these abound. The proprietors of Scotland

land require not to be informed, that all metals have poisonous effects on vegetable substances; and therefore, as the mountains of Scotland do, or do not contain metallic substances, so must the waters issuing therefrom be prejudicial or salutary in their effects, when used as means of fertilizing the soil.

From what has been stated, it is by no means intended to throw out the idea, that watering of land may not prove a beneficial practice, if introduced into the Highlands of Scotland, as well as it has done in many counties in England. But as it is a practice that, when adopted, does not in all cases, and in every district, produce alike beneficial consequences, it is only meant to suggest the propriety of using proper means to establish the theory of watered meadows and pastures on correct principles, so far as it relates to Scotland, before the proprietors or farmers embark too deeply in the practical part of the business. Except this be done, a few unsuccessful attempts at the beginning may be the cause of improvements, well calculated in many cases to increase the produce of the soil, and consequently to augment the rent, in a short time falling into disrepute. Should the attempt go on, and should failures in practice happen, the causes should be accurately ascertained, as thereby other consequences, beneficial in their effects, may result; as, if the failures arise from  
the

the bad quality of the water, and from its being impregnated with metallic substances, it may lead to the discovery of mines and minerals, which, without some such accidental mean of discovery, might have remained unexplored for ages.

A great portion of the lands, either in the central Highlands of Scotland, or in what may be called the skirts of the mountains, that can be improved by watering, lie in such sloping directions, that catch-work watering must be the prevailing system. Respecting the inferiority of that mean of improving the soil, enough has already been said.

The circumstance of water-meadow pastures, being so destructive to sheep, also merits the attention of those gentlemen, who in Scotland appear so anxious to introduce the practice of watering of land. If an imperfect fence be on some occasions productive of such bad consequences, as those formerly stated to have happened in Sussex, what may not be expected to result from a general introduction of this system in an open country, and where the farmer's capital is almost exclusively vested in sheep? That the watering of land may be introduced as a beneficial practice in some parts of the Highlands of Scotland, the writer entertains no doubt: But in the present open-field, or uninclosed state of that part of the country, added to the uncertainty which individuals



duals must labour under, in regard to the quality of the water that they have the power of using, he is of opinion, that those proprietors or tenants who intend to expend ten or twenty pounds the acre, for putting their lands in a situation capable of being benefited by watering, should, in the first instance, ascertain the quality of the water; and, in the second place, fence the fields in such a manner as to debar sheep from entering at improper seasons. Except these previous measures be adopted, the introduction of this practice, beneficial as it certainly is in several counties in England, may prove the reverse in Scotland.

END OF VOLUME THIRD.



